THE MIDDLE ḤAḌRAMŪT ARCHAEOLOGICAL SURVEY: SETTLEMENT PATTERNS IN SOUTH ARABIA

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For Yelena, Xenia, and Armando.

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ABSTRACT

THE MIDDLE ḤAḌRAMŪT ARCHAEOLOGICAL SURVEY: SETTLEMENT PATTERNS IN SOUTH ARABIA

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Despite decades of archaeological excavations in the western Wādī Ḥaḍramūt and its tributaries, when compared to its neighbors in Southwestern Arabia, the Pre-Islamic kingdom of Ḥaḍramūt is poorly understood. The interior Wādī Ḥaḍramūt of the Islamic period is even less well known, having had no prior archaeological exploration. Conducted in four short field seasons, 1997–2004, the Middle Ḥaḍramūt Archaeological Survey (MHAS) cataloged scores of sites in the great inland wadi system of Hadhramaut Governorate, Yemen, extending our knowledge farther east and later in time than previous studies. It also pursued an aggressively computerized approach to data collection and processing, as a test bed for future surveys. This dissertation presents the results of that fieldwork, with descriptions of the sites and associated material remains, as well as discussions of their implications for our understanding of the region's culture and history. In addition, it presents a ceramics typology spanning over two millennia of habitation of the wadi and an assessment of the methods used in the field and in the lab. Analysis of the kinds, distributions, and densities of sites found reveals the underlying organizational principles of Ḥaḍramī urbanism, explaining the anomaly of its Pre-Islamic tell sites and lending strong support to the belief that that the Wādī Ḥaḍramūt of the terminal Pre-Islamic and Early Islamic periods underwent severe depopulation.

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Introduction

Located in what is now the Republic of Yemen, the Wādī Ḥaḍramūt is the central valley of a vast drainage system in the arid interior of Southwestern Arabia. At times a major thoroughfare, wealthy trading kingdom, backwater, and exporter of people, culture, and religion, a broad and diachronic understanding of the region's archaeology has nevertheless been slow to develop. The Middle Ḥaḍramūt Archaeological Survey (MHAS) was initiated to explore the central stretch of the wadi with the express intent of further clarifying its most obscure chapters.

The problem of the underrepresentation of certain sites in the archaeological record of the Wādī Ḥaḍramūt has driven much of this study. Its missing Bronze Age and the particulars of the Pre-Islamic to Early Islamic transition form two great gaps in our understanding of its history and prehistory—gaps which this project intended to fill. But were these lacunae simply reflections of the scholarly preoccupation with the major Pre-Islamic sites, to the exclusion of smaller sites and ones of other periods? Or were sites from these poorly attested periods so ephemeral that they were effectively obliterated by post-depositional processes, and thus overlooked by (or even invisible to) previous expeditions? Or, perhaps, were the gaps indicative of regional depopulations? The very act of searching for these sites, as part of the MHAS strategy of full-coverage survey, would *ipso facto* address the first of these concerns; careful field survey would address the second; and the analysis of data thus collected would permit the assessment of the importance of the third potential reason for the gaps in the record. In the end, I propose, we find a predominance of Pre-Islamic sites because those sites break the normative rules governing the formation and distribution of settlements in the Wādī Ḥaḍramūt. Moreover, we find that the dearth of sites dating to the terminal Pre-Islamic and Early Islamic periods cannot be accounted for by taphonomy alone, and strongly suggest a regional collapse. The absence of these sites, then, becomes a matter of historical and anthropological interest, the counterpoint to the hypertrophied urbanism of the Pre-Islamic period.

Figure 1.1: Relief map of the Arabian Peninsula. The MHAS study area is marked here by the red box. (Base map from Patterson, 2007.)

Figure 1.2: Map of Southwestern Arabia, showing the major geographical regions, archaeological and historical sites, and moderns cities mentioned in this text.

1.1 Regional Geography

South Arabian studies are characterized by a preoccupation with physical geography. Travel to Yemen fosters this sense; each region has its own distinctive terrain—starkly beautiful seacoasts, rugged mountains, arid plateaux, verdant valleys, and of course desert. Every bit as impressive as the natural environs, human adaptations of and to their land—terraced hillsides, towns perched precariously on cliffs, and clustered tower houses—capture the imagination of tourists and scholars alike. This geography, literally and figuratively, undergirds the cultural history of the region, informing all aspects of archaeological research there.

Though popular conceptions of Arabia picture it as endless sand dunes, much of it is actually rocky and mountainous, and Southwestern Arabia is especially so. The region's geology is primarily sedimentary; the Yemeni highlands and the Abyssinian highlands, in particular, are composed of the same layers, split from each other by the Red Sea and Gulf of Aden rifts, and pushed up by basalt from below. In Yemen, east of the Red Sea littoral (the Tihāma), the mountains rise steeply before falling away gradually to the north and east. The tallest mountains in Arabia, rising some 4000m above sea level, are found in this zone, and the greatest portion of the Yemeni population lives on the interior plateaux, at elevations of 2500–3000m. In places, lava has oozed up through the cracks in this tableland, creating black mountains that jut through the overlying sandstone. Cinder cones also stand prominently on the Gulf of Aden coast, further attesting to volcanic activity. Away from the upward tectonic forces near the Red Sea, surface elevation drops toward the Rubʿ al-Ḫālī desert (the Empty Quarter)—the southwestern corner of which, the Ramlat as-Sabʿtayn, is the homeland of the Pre-Islamic trading kingdoms for which the region is most famous.[1]

East of the Yemeni highlands, between the Arabian Sea and the Rubʿ al-Ḫālī, three geological zones are present: the ʿAdan littoral; the jōl plateau; and the valleys that cut down into the jōl. The jōl, itself, is an arid tableland comprised of about 200m of Eocene and Cretaceous limestones

[1] See Naval Intelligence Division, 1946, pp. 51–55, and Brunner, 1997, pp. 191–192, for more detail about the region's geology.

capping earlier sandstone deposits.[2] In the Wādī Ḥaḍramūt, the greatest of the valleys cutting into the jōl, these limestone layers form cliffs in the upper sections of the canyon walls, which themselves can be up to 300m from the wadi bottom to the surface of the jōl. Running from west to east, the bed of the Wādī Ḥaḍramūt lies at roughly 1000m above sea level at its mouth near Šabwa, and about 600m near Tarīm in the east.[3] It narrows considerably across its length, but averages roughly 5km in the stretch east of Šibām, at the middle of the MHAS study area. Numerous tributary wadis, some of which are themselves quite significant geological features, flow into the Wādī Ḥaḍramūt, from both the north and south. East of Tarīm, the wadi narrows considerably, and is known as the Wādī al-Masīlah ("the flowing wadi")—reflecting the year-round flow of its waters.

The scree slopes at the base of the wadi walls continue to an unknown depth below the alluvial soils that form the valley's current bed. This alluvial silt is interspersed with gravel beds, which are occasionally exposed. Since Levallois flakes are found on the scree slopes and in the alluvial deposits, it has been suggested that the wadis have remained more-or-less in their current condition since the middle or late Pleistocene.[4] Though the region is generally poor in mineral resources, salt is mined near Šabwa and high quality Jurassic clays are mined locally by Ḥaḍramī potters. Locally-quarried limestone also forms an important part of the architectural tradition, providing material for stone foundations and the lime plaster that is so important for decoration and waterproofing. Recently, too, oil has been found in the area—so the jōl, which ten years ago was desolate, is now crisscrossed with mining roads. Fortunately, oil exploration has funded much of the archaeological research in the jōl and other affected areas, in what appears to be a genuine attempt at environmental impact studies and cultural heritage management.

Another defining feature of the physical geography of Arabia, of course, is its aridity. As with the notion of endless sand dunes, however, the actual hydrological environment is much

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[2] Caton-Thompson and Gardner, 1939, p. 22; Naval Intelligence Division, 1946, p. 54.

[3] Naval Intelligence Division, 1946, p. 31.

[4] Caton-Thompson and Gardner, 1939, p. 23; though see p. 318, below, for a discussion of the effects of irrigation upon the accumulation of alluvial silts.

more varied and complex than is its popular perception. Rainfall, slight overall, is concentrated in two monsoon seasons: a southwest monsoon in the early autumn, and a northeast monsoon in the springtime. Because of this rainfall, parts of Yemen—most notably the southwestern mountains around Ibb—are relatively lush, while the rest of the country (excepting during the monsoon seasons) is in fact quite dry. In the Wādī Ḥaḍramūt, yearly rainfall averages only 63mm per year—most of which falls between March and April.[5] The necessity of simultaneously controlling the destructive potential of flash floods, and capturing and diverting them for agriculture led to the development of "sayl" irrigation. The earliest anthropogenic modifications to the landscape are small-scale and regionally varied, but date to the 3rd millennium or earlier, and presage the later, more highly elaborated, systems.[6] By the time of the great Pre-Islamic trading kingdoms, these irrigation systems were monumental and highly regulated, reflecting the investment in and coordination by the kingdoms that they helped feed.

1.2 Timeline of Ancient South Arabia

Archaeological studies of Southwestern Arabia have focused most heavily on the Pre-Islamic period—when the regional political economy was marked by the dominance of the spice and incense trading kingdoms—and this study follows suit. But despite the far greater attention paid to the Pre-Islamic, the past ten to fifteen years have seen an explosion of work on earlier periods. Our knowledge of the Bronze Age, in particular,[7] has radically improved, and our understanding of the the Iron Age prior to the rise of the trading kingdoms and the Neolithic has likewise benefitted.

Traces of various populations in what is now Yemen are attested from the Palaeolithic period onward. Indications are that the earliest presence was temporary and seasonal, but by the Neolithic period there is a regularity to the material culture of certain groups such that we can identify them as distinct archaeological cultures (and perhaps even posit some as the earliest predecessors of

[5] Verba, Al-Kasiri, Goncharova, and Chizhikova, 1995, p. 110.

[6] See Edens, Wilkinson, and Barratt, 2000, pp. 860–861, and McCorriston, Harrower, Oches, and Bin ʿAqil, 2005, p. 150, for brief discussions of early water management systems in the highlands and eastern wadis, respectively.

[7] The term "Bronze Age" is here used cautiously, as it is more aptly applied to a Syro-Palestinian setting, imperfectly suited to the technology and chronology of Southwestern Arabia.

South Arabian culture). Following the end of the so-called "Neolithic Pluvial," however, we note the appearance of agricultural villages in the Jawf basin, the highlands, and the ʿAdan littoral.[8] In the highlands, these settlements developed sophisticated strategies to maximize arable land and control water, and desert fringe sites began diverting monsoon-fed floodwaters for irrigation.

Through the the 2nd millennium, these communities developed largely in isolation—perhaps with some cultural and material interchange, but as regionally differentiated cultures. In the Wādī Ḥaḍramūt, traces of the local precursors of what could later be called "Classical" Pre-Islamic Ḥaḍramī culture are found at Šabwa and in the Wādī Dūʿan and Wādī al-ʿAyn.[9] But the community (and, probably, proto-state) that coalesced around Marīb first developed the full suite of features that are the hallmarks of "Sayhadic" culture:[10] common artistic traditions and iconography, a local variant of Arabian polytheism, monumental writing with the "Musnad" alphabet, long distance trade in aromatics, and sayl irrigation.

But the distinctiveness of these cultural features should not be overly stressed; Some of the earliest ceramics at Raybūn (the largest site in the Wādī Dūʿan), for example, bear Musnad inscriptions. Nevertheless, changes in the material culture of the early 1st millennium BC does lead its excavators to propose the introduction of elements of Sayhadic (and especially Sabaean) culture

[8] See de Maigret, 1981, Wilkinson and Edens, 1999, and Vogt and Sedov, 1998, respectively, for discussions of these discoveries. See also Edens, 2002, and Wilkinson, 2005, for good overviews of "Bronze Age" Yemen, and Parker, Davies, and Wilkinson, 2006, p. 251 for studies showing the general increase in aridity in much of Arabia during the 4th and 3rd millennia BC.

[9] Sedov frequently uses the term "Classical Hadramawt Culture" as a self-explanatory label, but formally defines it as the admixture of indigenous Ḥaḍramī culture and a Sabaean import (Sedov, 1996b, p. 86). Germane to the discussion of the origins of Ḥaḍramī culture, the reader of the present work will notice my preferred spelling of "Ḥaḍramūt," as opposed to the more common "Ḥaḍramawt." This choice follows Salibi's etymology, which disposes of the "aw" diphthong in favor of a long "ū" sound on philological and historical grounds (Salibi, 1981). Since this transliteration is aligned with the most common local pronunciation, which to my ears sounds like a long "ō," I have chosen to use it as well. The prevalence of places in Ḥaḍramūt with names ending in "ūt" is sometimes cited as indicative of Canaanite roots for the pre-"Classical" culture. I am, however, uncomfortable with this hypothesis, and do not subscribe to it, despite its rough synchrony with the initial settlement of the region, for lack of strong archaeological evidence.

[10] The growth of these related cultures on the agriculturally marginal fringe of the Ramlat as-Sabʿtayn, which was known in antiquity as the "Ṣayhād," led Beeston to dub them, collectively, "Sayhadic" culture (Beeston, 1976, p. 3). Though this designation has been criticized for its imprecision, it has largely been adopted by archaeologists as a convenient shorthand for the cultures behind the Pre-Islamic trading kingdoms.

upon the local substrate at that time.[11] In the 1st millennium BC, Ḥaḍramūt, along with Maʿīn, Sabaʾ, Qatabān, and ʾAwsān—the other Pre-Islamic trading kingdoms—grew to control territories from capital cities situated in major wadis emptying into the Ṣayhād.

Of these kingdoms, Sabaʾ was clearly the earliest, most powerful, and most culturally influential (as is reflected by the relative size of its capital Marīb, by far the largest in Southwestern Arabia); Maʿīn was apparently in control of much of the long-distance trade, especially to North Arabia and the Mediterranean Sea; and Ḥaḍramūt, flanked on its west by Qatabān, stretched clear across what are now Hadramawt and Mahra Governorates and into the Ḍofār region of eastern Oman, and controlled the most valuable incense growing regions. ʾAwsān, relatively insignificant, was conquered by Sabaʾ in the early 7th century BC,[12] while the remaining kingdoms each dominated their own segment of the trade route. Frankincense and Myrrh were grown exclusively in southern Arabia, but were highly prized in Egypt and the Mediterranean. Transported by great camel caravans, each kingdom exacted tariffs on the goods passing through their territories, and thus grew wealthy and powerful from that trade—gaining and exploiting a mystique that earned them the name "*Arabia Felix*" from Roman geographers. This situation was not without conflict, of course, but it has been suggested that the kingdoms co-existed in a sort of confederation that lasted until the late 1st millennium.[13]

By the late 1st century BC, Rome, with Nabataean help, had tried and failed to take Maʿīn and Sabaʾ militarily. And while the trading kingdoms retained their independence and economic base, their control over the latter had already begun to change. Across the Red Sea, Axum was growing as a rival to the Southern Arabian states, fueled in part by the production of Frankincense in Africa. The discovery of the monsoon route in the 1st century BC, however, changed the spice and incense trade more drastically, as it permitted increasingly long sea routes between Arabia and India. To

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[11] Piotrovski, 1994, p. 64. This suggestion that Pre-Islamic South Arabian culture and state formation was imported from outside is certainly not new (see, for example, Müller, 1987, p. 49), but the Raybūn excavations provided the first concrete evidence from archaeological contexts to support the supposition that Sabaean culture—whatever its origins—itself spurred a wave of secondary (or tertiary) state development.

[12] Schippmann, 2001, p. 49.

[13] Sedov and ʻAydarus, 1995, p. 40. This would be the period of the Sabaean "Mukarribs".

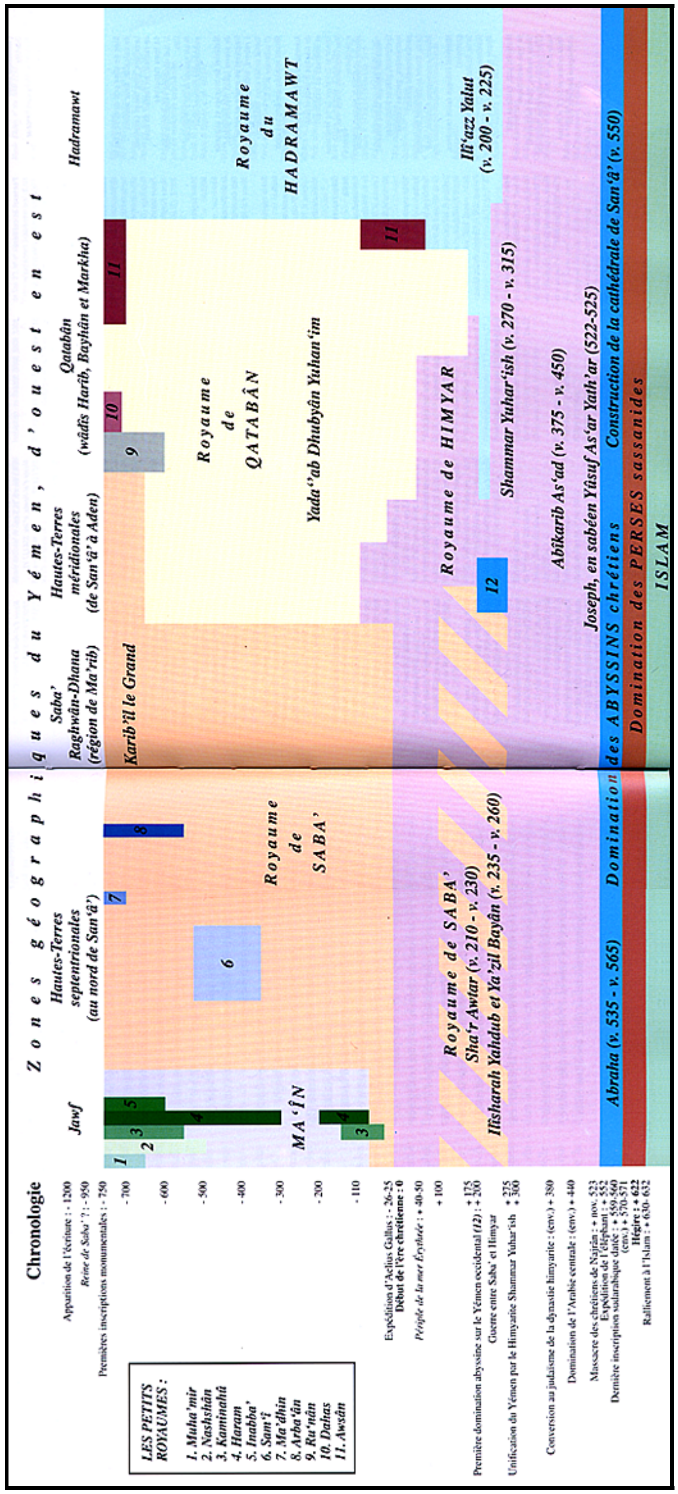

Figure 1.3: Timeline of the Pre-Islamic kingdoms of Southwestern Arabia (from Robin and Vogt, 1997, pp. 228–229).

be sure, the coastal trade along the Arabian Sea would remain important even into the modern era—but it lost importance for the spice and incense trade as sailors mastered the monsoons and bypassed many of the intermediary port cities. This also had the secondary effect of drying out the inland camel routes into the Wādī Ḥaḍramūt and reorienting the economic and political center of gravity in Southwestern Arabia away from the Sayhadic states, and more toward the coasts and the southwestern highlands.

The period of conflict that arose in the late 1st millennium BC between Qatabān and Ḥaḍramūt resulted in the the ultimate destruction of the former in the 2nd century AD.[14] At the same time, a new power emerged from other (apparently) unaffiliated tribal groups: Ḥimyar. This group, though borrowing culturally from Sabaʾ and the remnants of Qatabān, is not strictly of the Sayhadic tradition, having formed in the highlands rather than the desert fringe. Though the "Himyarite Era" is figured to have started in 115 BC, the Himyarites, themselves, were not a potent political force until some centuries later—and the commencement of this era relies on extrapolation from much later inscriptions.[15] And though Himyarite inscriptions are in the Sabaean language, the Himyarites, themselves, may well have spoken another South Arabian dialect. Regardless of their cultural affiliation, however, by the 4th century AD they were ascendant, with their Tubbaʿ kings annexing or conquering both Sabaʾ and Ḥaḍramūt. In sole control of the bulk of the aromatics trade, their wealth and influence grew. Art works from the period—statuary in particular—reflect the consumption of Mediterranean luxuries, and the probable importation of Roman artisans as well. The Himyarite kingdom continued to grow to empire size, eventually controlling much of Arabia and butting up against the Persians in the east, Axum in the west, and Byzantium to their north. Finally, in the 6th century, they lost territorial control to these other empires, being defeated, in succession, by Axum and Persia.[16] But with the dissolution of the Sasanian Empire, control of Arabia devolved to tribes from Northern and Central Arabia, with Kindah gaining control of much

[14] Müller, 1987, p. 51

[15] Beeston, 1981, p. 1.

[16] In a cruel irony of history, the Persians were initially invited to Yemen in order to expel the Abyssinians, before they themselves assumed power.

of Yemen and Ḥaḍramūt.

The subsequent Islamic era, of course, saw the shift in power from Southwestern Arabia northward to the Ḥijāz. Former Himyarite lands were among the earliest adopters of the new religion, having already seen the growth of Jewish and Christian populations, as well as at least one autochthonous monotheist religion, in the first centuries AD. But the conversion of the Persian governor of Ṣanʿāʾ in 628 AD ushered in the Islamic era in Southwestern Arabia.[17] Other tribal leaders also converted during the lifetime of the Prophet, but as should be expected in a region as balkanized as South Arabia by this time was, the transition was not always entirely peaceful, and met with resistance from certain tribal and religious quarters. Nevertheless, Southern Arabia soon became an important part of the Caliphate, providing manpower for its early expansion.

The transition from the Pre-Islamic to the Islamic periods brings changes in modern scholarship as well, from a predominance of archaeological studies to a predominance of historical ones. Though important archaeological work on the Islamic archaeology of Yemen has been undertaken in recent years—particularly along the coasts of the Red Sea and Arabian Sea—it is still far less well explored than is the Pre-Islamic period.[18] The present work makes no attempt to interpret the archaeology of the Islamic periods (beyond the transition from the Pre-Islamic to the Early Islamic), but merely documents what was found by the survey. The correlation of the archaeology to historical events—which, at any rate, are known almost exclusively from sources outside of the Wādī Ḥaḍramūt[19]—is practically impossible, given the lack of archaeological excavation and infrequency of imports in the area.[20] So, whereas a relatively detailed *historical* outline of the last 800–1000 years of the Wādī Ḥaḍramūt can be written, my *archaeological* analysis follows the coarse but servicable periodization used by Whitcomb in the only extensive treatment of the Islamic archaeology of the Wādī Ḥaḍramūt yet published: Early Islamic (to 1150 AD), Middle

[17] Smith, 1987, p. 129.

[18] See Keall, 1983, and Rougeulle, 2001, for discussions of the two major surveys of these regions' Islamic archaeology.

[19] Serjeant, 1950, p. 283

[20] Chinese porcelains are the notable exception to this absence of imported wares, but belong firmly to the Late Islamic period (see p. 257, below).

Islamic (1150–1500 AD), and Late Islamic (1500–1850 AD).[21]

1.3 Goals of the Middle Ḥaḍramūt Archaeological Survey

In three short seasons, survey work was conducted in the Wādī Ḥaḍramūt and its major tributaries between the cities of Qaṭn and Tarīm—a region chosen primarily because of my familiarity with the region around Šibām (from having been site surveyor on the NYU excavations at Jūjah in 1994 and 1995). Though my initial intent was to survey only the area in the immediate vicinity of Šibām—Wādī Nām, Wādī Jaʿaymah, the northern end of Wādī Bin ʿAlī, and the section of the Wādī Ḥaḍramūt where they all join—I was advised by Professor Alexander Sedov to examine a wider area if I expected to say anything useful about the regional settlement patterns. The MHAS study area was thus expanded to the limits imposed by topography, prior surveys, and the practical maximal extent that could be covered (see Fig. 1.4). Within this region, it was felt that a full-coverage survey, recording sites of all types and periods, would be the most useful in the construction of a new archaeological map. And though prior surveys had been made in the area, the MHAS project would improve upon their results with its wide areal and chronological coverage. Our knowledge of the archaeology in this region was mostly limited to the major Pre-Islamic sites, at the expense of the smaller and later sites, and mostly collected by non-specialists—so this project would, by filling in details grant a more holistic understanding of the region's culture history.[22]

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[21] Whitcomb, 1988. The coarseness of his periodization should in no way detract from Dr. Whitcomb's excellent study, upon which I rely heavily. However, it does highlight the poor state of Islamic archaeology in the Wādī Ḥaḍramūt that such an expert in the field would only divide the chronology so roughly. That the ceramics he studied were collected by other archaeologists a full quarter century before his publication further illustrates the slow pace of Islamic period archaeology in the Wādī Ḥaḍramūt.

[22] Four prior surveys conducted by archaeologists had been through the MHAS study area: Gertrude Caton-Thompson's expedition, which only briefly scanned this region before settling into the Wādī ʿAmd; the Smithsonian Institution, which conducted a fairly intensive survey of the region, but focused mainly on the Pre-Islamic sites (and which was never adequately published); the Mission Française survey, which focused almost exclusively on Pre-Islamic monumental architecture, especially in the Wādī ʿIdm and Wādī al-Masīlah; and the SoYCE survey, which did not treat this region in any systematic manner (and only as an aside to their long-term presence farther west). These projects' work is universally excellent, but too narrowly focused or incomplete to permit the reconstruction of regional patterns of settlement and land use. Nevertheless, I am deeply indebted to my predecessors here, for the work that they conducted.

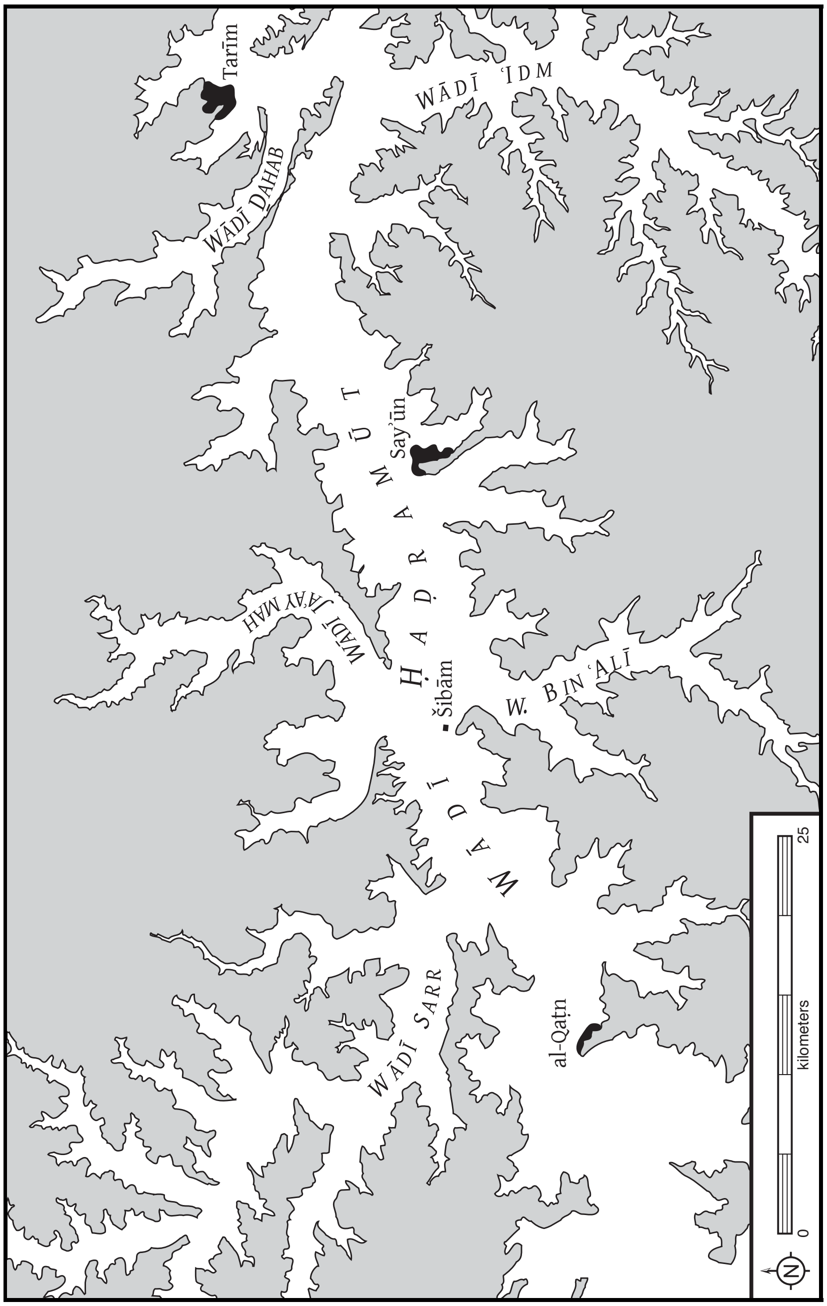

Figure 1.4: Map of the MHAS study area in the Wādī Ḥaḍramūt and its major tributaries.

Given my computer-centric approach to archaeological fieldwork, the technophilic bent to this study is both deliberate and unavoidable. Anticipating the central role that computerized methods of data collection and analysis would play, this project was designed to address two broad and interrelated goals in the pursuit of an improved archaeological understanding of the Wādī Ḥaḍramūt: the primary documentation of archaeological sites, and the exploration of new techniques for the production of that documentation. The present work divides these observations, chapter-by-chapter, as follows: Chapter 2 describes the conduct of the field survey and discusses the computer methods applied to the data, with reference to how they may be adapted to other projects; Chapter 3 is primarily a gazetteer of the sites found, with a discussion of other projects' work; Chapter 4 describes the ceramics collected, and creates a typology of forms and decorations for the Islamic periods; Chapter 5 lists the small finds, highlighting their significance to understanding the sites on which they were found; and Chapter 6 concludes this work, drawing upon the observed patterns of site distribution to discuss site recovery, the meaning of "urbanism" in the Wādī Ḥaḍramūt, and to propose an explanation for the dearth of materials of the Pre-Islamic to Early Islamic transition. Concrete contributions of the MHAS toward the archaeology of Southwestern Arabia include:

- The creation of a new map of archaeological sites of the Wādī Ḥaḍramūt. Newly-discovered sites are noted, and previously-known sites are, thanks to GPS data collection, located with a degree of accuracy not before possible. Public availability of these data in GIS formats permits easy access and manipulation by other researchers.

- The creation of a publicly-accessible project database, which can serve as a data source for the Yemeni antiquities authorities in their attempts to preserve their country's archaeological heritage. As such, it can be useful for urban planning, efforts to combat the looting and plundering of sites, and as documentary evidence of sites lost to urban sprawl and mechanized agriculture.[23]

- The creation of a ceramic typology that helps extend the regional chronology of the Pre-

[23] This website is accessible at `http://www.lugal.com/mhas/`, and all attempts will be made to ensure its accessibility for the next few years, at a minimum.

Islamic into the Islamic periods.

- The proposal of models of urbanism and site distribution that are applicable to the Wādī Ḥaḍramūt, including underlying principles that can be used predict the predominant site types and distributions in the Pre-Islamic and Islamic periods.
- The proposal of a sequence of events that resulted in the collapse of Ḥaḍramī society in the terminal Pre-Islamic. It is hoped that future historical and archaeological work will test this hypothesis.

Chapter 2
Methods

From its inception, the MHAS was conceived of as a survey project, with little or no excavation planned. This decision to forego excavation was a deliberate attempt to keep the scope and expense of the project to a minimum. Though such a plan has obvious drawbacks—most notably the difficulty of determining the chronological sequence of found artifacts—it also freed me from the more prosaic managerial duties attendant with excavation and presented me with the opportunity to aggressively explore technological solutions to the conduct and analysis of archaeological survey. Major themes of this fieldwork—its goals and strategies, and the solutions found to particular problems—are presented below.

2.1 MHAS Field Survey

Archaeological survey has a long and rich tradition in the Near East, particularly in Greater Mesopotamia where it has been a staple for over a century.[1] Nevertheless, until recent years, South Arabia has been outside the mainstream of archaeological research. The MHAS, as an outgrowth of the NYU excavations at Jūjah, is one of a number of projects of varying scope—including surveys by graduate students at Western universities [2]—initiated in Yemen since Unification. Archaeological research in the former PDRY, in particular, has accelerated greatly with the change in political alignment of the former South Yemen (after 1990) and the subsequent relaxation of restrictions on foreign researchers. Recently, the intensification of oil prospection in Hadramawt Governorate has funded numerous small-scale surveys as components of environmental impact studies.

The most famous regional surveys in the Near East—Adams' Mesopotamian surveys—were

[1] There is no benefit, here, to re-hashing the oft-repeated history of archaeological survey in Mesopotamia. But see, for example, Sumner (1990) and Wilkinson (2000) for overviews.

[2] E.g., Lewis, 2005, Khalidi, 2006, and Crassard, 2007.

survey-only projects, lacking an excavation component.[3] Nevertheless, the data collected and maps drawn from that work fed years' worth of subsequent excavations. And though there is a mild stigma against archaeological survey as of lesser value than excavation (and mostly useful for finding sites to dig), it has recently come into its own as a valid approach to the study of past societies, capable of providing insights that are unattainable by excavation alone.[4] Regardless of its status vis-à-vis excavation, fruitful interplay between archaeological survey and archaeological excavation has long been recognized. And though Neubauer recently argued for the cooperation between archaeological prospection and excavation as if it were a new concept,[5] there have been decades of collaboration between the two modalities—including, in recent years, the use of GIS as a data conduit (for which, admittedly, Neubauer is pressing).

In their most radical forms, "Landscape Archaeology" and "Siteless Survey" subsume the analytical importance of sites (as discrete spatial units) to that of their spatial distribution, relative densities of various traces of human activity, and/or the landforms across which those activities took place.[6] The MHAS, however, cannot fall into this category, and retains sites as the principle unit of investigation within its region, in what is sometimes termed the "Monument" model of archaeological survey—an admittedly artificial treatment of sites as discrete points on the landscape.[7]

The survey region, itself, is chosen on purely pragmatic grounds. Recognizing the notorious difficulty with which archaeological regions are defined,[8] Fish and Kowalewski point out that archaeological study areas are most commonly chosen by physical boundaries enclosing an area

[3] Adams, 1965; Adams and Nissen, 1972; Adams, 1981.

[4] Wilkinson, 2000, p. 220.

[5] Neubauer, 2004.

[6] Banning, 2002, p. 87.

[7] Banning, 2002, p. 13.

[8] Clarke's definition of site systems as "a set of sites at which it is hypothesized that the interconnection between the sites was greater than the interconnection between any individual site and sites beyond the system" (Clarke, 1977) is perhaps the most concise practical definition of an archaeological region. The wide time span covered by the MHAS survey, however, invalidates this as the sole criterion for the definition of my study region, since it cannot be demonstrated that the sites in the MHAS study area are in any way related across all time periods.

with some degree of cultural integrity.[9] Thus it is with the MHAS study region, within the context of pre-existing projects: the cliff faces of the wadi walls provide a ready spatial delimiter on all sides, the change in topography and name (from Wādī Ḥaḍramūt to Wādī al-Masīlah) east of Tarīm likewise creates a sensible eastern boundary, and the SoYCE projects (of which the excavations of Raybūn was the centerpiece) effectively surveyed the Wādī Dūʿan and the western end of the Wādī Ḥaḍramūt, providing a western edge to my survey region. The space contained by these boundaries, called the "Middle Ḥaḍramūt" for convenience, then became the setting in which archaeological sites are considered part of the MHAS.

Sites within the study region are defined rather loosely as nearly any physical evidence of past human activity. Because, at the commencement of this project, the types of sites to be found were largely unknown, and because the broadest possible chronological collection was desired, the threshold for which sites were labeled as such is perhaps lower than it would be on other projects, and is certainly lower than it now would be, having completed the analysis of the survey data. Also, the spatial separation of sites—how far removed any given features need to be before they are considered multiple sites, rather than simply two aspects of a given site—was never codified during the MHAS fieldwork. Thus, sites such as S-16, S-18, and S-19 might have been designated a single site, given what is now known about their chronology, and the Pre-Islamic and Islamic houses at S-83 would now most certainly have been cataloged as two separate and unrelated sites. Total counts of sites recorded, then, should be taken with a grain of salt.

Site types recognized by the MHAS survey include:

Encampment Stone rings, temporary stone shelters, and other similar ephemera that are suggestive of short-term occupation.

Graffiti Inscriptions on immovable surfaces, such as boulders.

Industrial Sites with a clear industrial function (such as kilns), but without any immediate settle-

[9] Fish and Kowalewski, 1990, p. 265.

ment to which it could be associated.[10]

Isolated Structure Houses and fortresses or lookouts, without any immediate neighbors.

Mortuary Cairns, caves, and stone alignments, all of which are most typically associated with mortuary practices of various time periods, as well as Islamic period cemeteries and saints' tombs.

Road or Path Paved or worn routes between and beyond point sites.[11]

Settlement Any cluster of structures.[12]

Water Management Canals, dams, dykes, and sluices.

2.1.1 Phase I: Pilot Project

The phased approach taken by Adams' surveys, wherein he followed general survey with broad coverage by localized and more intensive survey, was adopted by the MHAS as a reasonable and scalable approach to archaeological survey. Banning's recent book on survey methodology provides ample justification for this kind of approach, checking and refining the results of the extensive survey with quantifiable results of controlled intensive survey. Within his typology of methods, the "Purposive survey" employed by the MHAS is validated as a reasonable approach, given the project's resources and objectives.[13]

The 1997 season of the MHAS, then, was conceived of as a pilot project.[14] It was planned

[10] S-34 is the only MHAS site designated as simply an industrial site, but it is likely that its associated settlement was overlooked (see Fig. 2.11, below).

[11] When I decided to include this site type, it was expected that numerous roadways and paths would be found, illuminating the ancient inter-site communication. However, S-39 is the only example of this type of site, and owing to its apparent continuous use, it is unclear whether it is ancient or modern.

[12] Owing to the influence of Mesopotamian archaeology to the field, the archetypal settlement site in the Near East is the tell. However, it should be noted that tell sites are rare in South Arabia. Šibām is the most famous such site in the Wādī Ḥaḍramūt proper, and is in a distinct minority (Šabwa, Raybūn, and Makaynūn being the only other sizable tells in the region). Thus a simple "cluster of structures" serves as a perfectly useful definition for settlement sites in the Wādī Ḥaḍramūt and its tributaries.

[13] Banning, 2002, p. 133.

[14] See Zimmerman, 1997.

to last two weeks, and to cover the area in the general vicinity of Šibām. No particular survey strategy was employed because the primary intent of this season was to test my ability to conduct fieldwork, rather than to collect data rigorously. Though data collection was clearly an important component of this test, the data, themselves, were never expected to form a major body of the overall project. Instead a subjective assessment of the kind and quality of data that could be collected in this short time period was to be the season's main contribution.

In fact, the project lasted ten days—August 22–31, 1997. The GOAMM representative was Dr. ʾAbd al-Azīz Bin ʿAqīl, with whom I had worked in 1994 and 1995 at Jūjah, and who I knew would be an invaluable resource on this survey. Because of the skill with which Dr. ʾAbd al-Azīz learned of sites in the region, my initial hope to survey Wādī Nām and Wādī Jaʿaymah (the two wadis to the north of Šibām) somewhat systematically was abandoned almost immediately, and we instead found ourselves traveling by car each day to various sites in the Šibām area (see Subsection 3.1.1, below). This revised plan, though very haphazard, was deemed useful in that it allowed me to see a wide range of sites and collect a variety of ceramics and other objects that was likely greater than would be possible in the Wādī Nām and Wādī Jaʿaymah alone. *Post facto*, it was reasoned that these would form a solid basis of a study collection for later stages of the project.

Data collection on each site visited in 1997 was similar: a GPS receiver was placed in a prominent location and permitted to take multiple readings (later to be averaged for greater accuracy—see Subsection 2.2.3, below) while we explored the site. A few photographs were taken of the site, sometimes to record interesting features, but mostly to facilitate later positive identification of the site. A brief description of the site was entered into a notebook, sketch drawings were sometimes made, and collections were also taken. The surface collections were bagged on-site by material (ceramic, stone, bone, etc.), and the contents were later referred to collectively by their bags. After our return to our quarters, bagged collections were photographed and GPS readings, notes, digital photographs, and records of the collections were entered into the project database.

2.1.2 Phase II: Site Reconnaissance

Subsequent reference to the 1997 database revealed its inadequacies, so it was altered in preparation for the following season (see Subsection 2.2.5, below). However, the overall approach to site reconnaissance taken during the pilot project was deemed sufficiently successful to warrant a repeat in 1999. The second season of the MHAS, then, was taken to be a refinement upon the 1997 season, with a wider areal extent and somewhat more refined methods. Mostly, however, it was conceived of as the first of two seasons in rapid succession. Sites identified in this prospection phase were to be re-visited and recorded more carefully in the final phase of the project.

The 1999 MHAS season lasted the entire month of October, and was conducted by me with the professional accompaniment of Ḥussayn al-ʿAydarūs as the GOAMM representative.[15] Fieldwork followed a similar schedule and pattern to that of 1997, but was based out of Sayʾūn, rather than Šibām. The 1999 season attempted to cover the fullest extent of the chosen study area by car and foot—and we succeeded in penetrating deeply into the largest tributary wadis of the main wadi (Wādī Sarr, Wādī Jaʿaymah, Wādī Bin ʿAlī, Wādī Ḏahab, and Wādī ʿIdm), and to the ends of most of the smaller tributary wadis. Much of the main wadi was also covered, but we were prevented from fully exploring its northern half between Sayʾūn and Bōr, which was unreachable for a full week because of impassable floodwaters. The westernmost edge of the study area in the main wadi (the region north of Qaṭn) lies under aeolian dunes, and was also omitted from our survey due to lack of time and the great difficulty in traversing this terrain. Lack of time also prevented us from exploring Wādī ʿIdm as carefully as we would have liked, especially in the area around Mašġah, but since the sites there are relatively well-known, their omission from this phase of fieldwork was deemed acceptable.

Out of expedience, the 1997 season only visited sites on the wadi floor and the lowermost scree slopes. The terrain considered by the project was codified in 1999 to include the wadi bottoms, the lower scree slopes, and the first limestone ledge as well as hillocks and spurs jutting from the wadi floor. The upper scree, the cliffs behind them, and the jōl were all explicitly excluded from

[15] See Zimmerman, 1999.

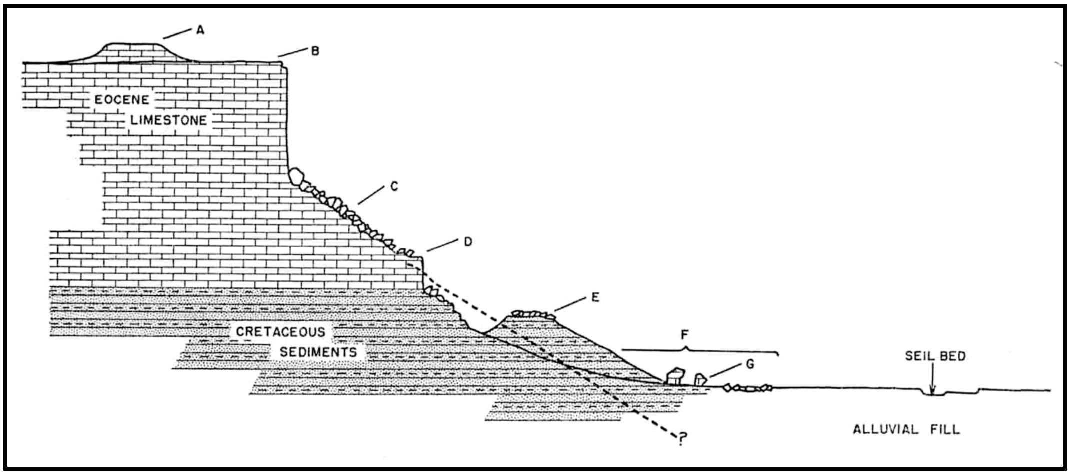

Figure 2.1: Cross section of the terrain types encountered in the Wādī Ḥaḍramūt and its tributaries (taken from Van Beek *et al.*, 1963, Fig. 2). Here they are termed: A) upper plateau remnants; B) main plateau; C) talus; D) limestone bench; E) spurs and outliers; F) low-lying features (of varying types); G) rock shelters; alluvial fill; and seil bed.

the survey region (see Figs. 2.1 and 2.2). Though this region is somewhat artificial—in particular given the existence of roads connecting the wadis with the jōl, and the interaction of jōl-dwelling nomads with the settled populations of the wadis—it forms a cohesive unit that is easily recognized as such in contour maps and satellite imagery (see Appendix C).

As during the first phase, GPS readings, photographs, and descriptions were taken of each site visited so as to allow for re-identification of the sites in the third phase of the project. Notes and GPS readings were also taken indicating the locations of other sites that were seen en route, but not visited by us. On each site visited, surface collections were also made, but as opposed to those taken the previous season (which were rather large and undiscriminating accumulations of surface artifacts), these were selected in the field to serve as representatives of each site for comparison with excavated materials in the reconstruction of a regional chronology. In the laboratory, all collected materials were photographed, drawn, and entered into the project database.

Figure 2.2: A view of Wādī Ḏahab, showing the terrain types noted in Fig. 2.1. Terrain included in the MHAS survey extends across the valleys from the first ledge (D)—narrow and relatively inaccessible in this wadi, but broad and easily reached in parts of Wādī Bin ʿAlī—across the lower scree slope, including ridges and spurs (E), gravel beds and the valley floor (F), and the alluvium. This photograph is taken from atop a ridge (E), the surface of which occupies most of the foreground.

2.1.3 Phase III: Regional Survey

A small team was subsequently assembled, including another archaeologist, an architectural historian, and a geomorphologist (all U.S.-based graduate students), and funding was being procured for a third phase of MHAS fieldwork in early 2000. This phase was expected to last about two months, and had as its mission the filling in of gaps left on the map from 1999, re-visiting a subset of the sites found in previous years for more thorough data collection, and walking a number of transects to test the efficacy of the previous years' methods.[16] Unfortunately, however, this phase was postponed by a family emergency, and was subsequently abandoned. The loss of the third

[16] Banning discusses the effects of visibility and obtrusiveness on archaeologists' success in finding sites (Banning, 2002, p. 48). The problem of undercounted sites in Near Eastern surveys, however, has long been recognized; Adams, through intensive re-surveying of a plot previously surveyed by Jeep, found that he had initially missed up to 1/3 of the sites there (Adams, 1981, pp. 40–41). But the problem of under-recording of certain sites goes beyond simply failing to find smaller sites because of a surveying method that moves too quickly; Casana's recent work in the Amuq valley of Turkey shows that Braidwood undercounted Late Bronze Age sites not only because they are smaller and less prominent than Early Bronze Age sites, but also because they lack easily identifiable type fossil ceramics (Casana, 2007, pp. 195–197). Correcting for this undercounting allows for a new reconstruction of changes in the regional settlement patterns through time. Such fine-grained analyses are still not possible for the Wādī Ḥaḍramūt, but it was hoped that the proposed Phase III survey would be a step in this direction.

phase of the project has had the unfortunate effect that the data set herein presented is somewhat incomplete, consisting of unsystematic "grab bag" surface collections, sketch maps, and brief descriptions from Phase I and Phase II alone. Also, the inclusion of a trained geomorphologist in Phase III would certainly have improved the certainty with which I present my historical conclusions. Nevertheless, the data presented still do appreciably improve the overall picture of the archaeology of the Wādī Ḥaḍramūt.

Had Phase III of the MHAS project proceeded as planned, the as-yet unused (on this project) field methods would have included:

- Additional prospection, particularly along the northern edge of the main wadi, west of Bōr.
- Total station maps of a subset of the MHAS sites.[17] Sites selected would have included, at a minimum, S-15, S-23, S-26,[18] and S-65. (See Chapter 3, below, for descriptions of the MHAS sites.) These maps would have recorded site topography and surface architecture. They also would have served as the basis for the on-site collection strategy.
- Sampled surface collections on the selected sites. The specific sampling strategy to be employed, the extent and spacing of the samples, however, was not decided upon before this phase of the project was abandoned.
- Transects would have been walked across the wadis, including the scree slopes and lower ledges (where present). The exact spacing and number of transects had not yet been decided upon, but at a minimum we would have crossed the Wādī Bin ʿAlī in the vicinity of S-65, the Wādī Ḏahab near S-42, and the Wādī ʿIdm near S-45—three zones with different types of silts which would have provided a clearer understanding of the various natural and anthropogenic alluvial accumulations in the wadis. Time permitting, transects would also have been walked across the Wādī Ḥaḍramūt to the west of Šibām and to the east

[17] On most archaeological projects in which I have participated, I have done so as the project's surveyor, usually using the *SiteMap* software which I helped develop at MASCA (Zimmerman, Fitts, and Pouls, 1999). I was, therefore, fully expecting to use these tools for mapping sites in the MHAS project.

[18] This map would have been a refinement of the map that I made of S-26 (referred to as "J2" by the NYU project), as part of the 1994 excavations at Jūjah.

of Sayʾūn—zones in which it is expected that the previous work missed a number of Pre-Islamic village sites.

2.1.4 Subsequent Field Seasons

Travel to the Middle East afforded two short study seasons of the MHAS.[19] One week in 2001 was spent in Sayʾūn drawing, photographing, and describing objects and sherds collected in previous seasons. No new fieldwork, however, was conducted. Then again, in 2004, two weeks were spent in Sayʾūn, which afforded the opportunity to complete the drawing and photography of objects collected in 1997 and 1999. One day was also found in 2004 to conduct some limited site reconnaissance. Sites S-83, an Islamic town noted during the excavations at Jūjah, and S-84, a lookout on the scree slope to the west of S-23—both of which were previously discovered, but not visited in the 1997 or 1999 seasons—were visited and recorded as per the methods of the 1999 season. Site S-23, a potentially significant Pre-Islamic village with an extramural hillside temple, directly adjacent to S-84 was also briefly re-examined at this time. Significant numbers of sherds were not fully recorded during the 1999 season because it was expected that they would be examined in the subsequent Phase III season, so it was fortuitous that these two later seasons took place. Had they not taken place, these objects would not have been properly cataloged, and thus would not have been incorporated in the present work.

2.2 Computerization in MHAS

Owing to my decidedly computer-centric approach to data collection and management, computers and other digital technologies would have naturally formed an important component of the present study, regardless of how explicit their role would be. However, with financial backing from a joint J. M. Kaplan Fund/University of Pennsylvania Museum Technology Grant, extra impetus was given to develop and test systems for their broad applicability to other field archaeologists. What follows, therefore, is a discussion of the major technologies employed by MHAS, details of their

[19] See Zimmerman, 2001, and Zimmerman, 2004.

use, and general tips and program code that may ease their adoption by others.

2.2.1 Computers in Archaeological Fieldwork

In archaeological fieldwork, as in businesses and offices, computers in general—and personal computers in particular—were widely adopted in the 1980s and 1990s, and have approached saturation in the first decade of the 21st century. Most of this use has tended toward the prosaic—particularly simple word processing—but more sophisticated and specialized applications have also gained acceptance.

With regards to archaeology, the main catalyst of this adoption has been the recent introduction of fast, cheap, and reliable laptops, powerful enough to compete with desktop computers, and with batteries lasting three or more hours on a full charge. Though I, personally, have always used laptops in the field, and though the MHAS research design always presupposed their availability, it is only in the last few years that their capabilities have grown to the point that their use is no longer a compromise between the benefits of having a computer in the field and the limitations imposed by their portability.[20] Currently, within a given vendor's product line, the primary distinctions between models are the screen size, CPU speed, amount of RAM, hard drive size, hard drive speed, wireless networking options, and type of removable media drive. For a computer that will be used for a variety of tasks (especially tasks such as those described below), it is highly recommended that an archaeological project budget for a laptop near the high end of a given product line. Provided that the computer is not mishandled, such a machine can be used for two or three years in its primary role(s)—following which, it will probably best be used for less processor-intensive tasks such as word processing and email.

Improvements in laptops notwithstanding, the most dramatic advancement in computer technologies since the mid 1990s has clearly been the growth of networking and the internet. However,

[20] This thesis has been written on a series of laptops, ranging from an 800MHz *Apple iBook* in 2003 through a 2GHz *Apple MacBook* in 2008. At the time of their purchase, each of these computers was at the mid-range of available models. Furthermore, all of the data analyses, mapping, and illustration in this work were performed on these laptop computers, without recourse of desktop workstations. Current, even more capable, hardware can be purchased from a variety of vendors, and running a variety of operating systems (see below), for between $800 and $2000, US.

owing to the remoteness of most archaeological sites, the internet, as such, has had very little direct impact on the conduct of fieldwork. Certainly it has made fieldwork preparations—from basic research to the purchasing of equipment—easier, and the ready availability of email and chat programs has sped up communications between field archaeologists and their colleagues and families. But internet access in the field remains problematic. The internet, especially the web, however, is an exceptionally good medium for the post-fieldwork dissemination of information—from relatively simple posting of project reports to searchable online databases. Online access to the MHAS database has been a goal of this project (see Subsection 2.2.5, below).

In contrast to in-field internet access, which is dependent upon some kind of data connection to the wider world (meaning, at a practical minimum, decent quality direct phone lines), local area networks (LANs) are currently feasible. The low cost of many consumer-level network components makes dig house or workroom LANs attractive propositions. Their practicality, however, is debatable. I am aware of only a handful of projects that have attempted, with mixed success, to create such a LAN, and have yet to see a pressing need for one. Four obvious uses for such LANs do present themselves: 1) to provide a common gateway for internet access; 2) to provide for centralized file server(s) to facilitate data storage and backup; 3) to host a multi-user network-accessible database server to manage the field data; and 4) to provide common access to a printer. The first of these uses is, clearly, subject to the availability of internet access, as discussed above. The second and third uses suffer from their inherent complexity. And whereas centralized file and database services have great potential, it is unlikely that most projects can afford the dedicated network and/or database administrator needed to ensure their proper functioning. Nevertheless, laptop computers nowadays are usually equipped with standard wireless networking hardware wireless network cards (802.11a/b/g/n and Bluetooth). This prevalence improves the ease with which *ad hoc* project LANs can be created, thereby increasing the likeliness that they will become integral in the management of project data. But regardless of the untapped potential of project

LANs, and regardless of their appeal to me,[21] LANs have had no direct use in MHAS, with its single field computer. However, given a larger project, a project LAN with a file server would certainly have been built to ensure data security and to further test the practical limits of computers in archaeological fieldwork.

As computer hardware has advanced, so too have their operating systems. Modern operating systems—whether *Windows XP*, *Macintosh OS X*, or any of the numerous varieties of *Linux* or *BSD*—have the features and stability required for fieldwork. Each of these has its own strengths and weaknesses for the field archaeologist. The major strength of *Windows* is its ubiquity—software and troubleshooting know-how are easily found worldwide. The other operating systems listed above, all *UNIX* variants or clones, are extremely stable, relatively untroubled by viruses, and capable of running a vast array of Free and Open Source Software (FOSS)—though finding and installing such software is sometimes tricky. The *Macintosh* operating system excels at a tight integration with its hardware and software applications that place a premium on ease of use, whereas *Linux* and *BSD* operating systems can be acquired for free and installed on a wider range of hardware. With *Apple's* adoption in 2006 of *Intel* processors, *Windows*, *Linux*, and *BSD* could be used on all major brands of computer hardware—so one's choice of operating system can now be almost totally independent from one's choice of hardware vendor. (*Apple's Macintosh OS X* operating system, however, can still only be used with *Apple* computers.) Because of my deep familiarity with *Macintosh* programming and troubleshooting, MHAS has used *Apple* computers since the project's inception. The introduction of *Macintosh OS X*, with its *UNIX* roots, however, has permitted the conversion of the project database, GIS, and much scripting from proprietary (and frequently pricey) software to Open Source equivalents. This has been a very viable approach, and other researchers are urged to investigate Open Source alternatives to commercial software as a means of cutting costs while concurrently improving the portability and longevity of

[21] As an aside to my dissertation research, I have also outlined a system for integrated, real-time, on-site data collection and management system for archaeological excavation that is critically dependent on a wireless LAN. Upon completion of my thesis, I plan to develop this outline into a working prototype, and would like to test it in the field.

their data files.[22]

2.2.2 Digital Photography

Since the commencement of the MHAS fieldwork, digital photography has evolved from expensive novelty to one of the fastest growing segments of the consumer electronics industry, and has all but replaced film for snapshots and amateur photographs. In 1997, in addition to two film cameras (one for Black-and-White photographs, and one for color slides) I purchased an inexpensive digital camera (an *Agfa e370*), with the intent of replacing *Polaroid* snapshots with digital snapshots. This camera, a fixed lens point-and-shoot with minimal features, long battery life, and 640x480 pixel resolution (0.3 megapixels), proved to be an entirely adequate replacement for *Polaroids*—especially for the ease with which digital photos were included into the end-of-season project report. Following the 1997 MHAS season, it was clear that digital snapshots were superior to *Polaroids* in all respects but one: since they require a printer for hard copy, they could not be annotated with a pen in the field as is often done with *Polaroids*. Though some portable inkjet printers have been commercially available since the early 1990s, the expense, fragility, and power requirements of most printers prohibited their use in the field except in the relatively clean conditions of a dig house. The expense of inkjet cartridges and their propensity to clogging (especially in hot climates) further reduced their practicality in the field. The inability to mark directly on a digital image, as many archaeologists had become accustomed to doing to their *Polaroid* photos, means that one has to resort to sketch drawings, written descriptions, and memory to record obser-

[22] See Bezzi *et al.* (2004) for a recent overview of available Open Source programs of interest to archaeologists. As of 2007, the pace of ongoing development of Open Source programs, spurred in large part by the worldwide *Linux* community (which has far greater penetration into university science and engineering departments than into the general computer-using public), has been dizzying. The introduction of new programs and improvements to old programs are now so frequent that the screen captures from Bezzi *et al.'s* three year old article already appear dated. Fortunately, improved usability has been a major driving force behind many of these changes—so the technical barriers to non-computer specialist archaeologists are generally dropping. If this trend continues, the recommendation to consider Open Source alternatives to commercial products should become increasingly viable into the next decade.

vations and ephemera that could perhaps more quickly and easily be jotted onto a photograph.[23]

Because of the success of digital photography in 1997 and the improvements to digital cameras over the following year, an even more aggressive use was conceived of for the 1999 season: In order to limit the number of cameras needed and the cost of multiple types of film, I determined to abandon Black-and-White film photographs entirely. Nowadays, Black-and-White photographs are useful primarily for publication graphics. However, publications are increasingly being submitted electronically, implying that at some stage of the process, published photographs are scanned into a computer (usually by the author). Because of this, I felt that it would be much simpler to scan color slides and convert the scanned images to greyscale, than it would be to carry around a dedicated Black-and-White camera (and film) for the few images destined for publication. Thus, field photographs in the 1999 season were taken with both the *Agfa* digital camera and a *Nikon 8008s* SLR loaded with professional quality slide film. Object photographs were shot on slide film with this SLR and also digitally with a *Nikon CoolPix 700* digital camera at 1600x1200 pixel resolution (1.8 megapixels).

As I had hoped, abandoning Black-and-White photography in 1999 simplified fieldwork, and proved to be very well suited to archaeological survey. Digital photographs, too, greatly accelerated the speed with which photographs could be entered into the field database, thereby increasing its usefulness (see Subsection 2.2.5, below). Reliance upon slide photographs, however, has been the weakest link in the system. As expected, scanning slides for publication has worked quite

[23] The growth in popularity of digital photography has inevitably led to the development of a variety of photograph printers geared for the consumer electronics market. Though these are generally small components, and can be purchased for under $200, they are still not considered portable printers. Moreover, as with their inkjet predecessors, they require a constant supply of special ink and paper, which may not be easily obtained in many parts of the world. Recently, printer paper with embedded dyes has been announced (see `http://www.zink.com/`), and the anticipation that it will soon be found in portable printers for digital cameras has generated considerable excitement among many consumer electronics pundits and digital photography enthusiasts. If these printers—as yet unreleased—live up to their expectations, are sufficiently durable, are relatively inexpensive, and their supplies can be found worldwide, they may well prove useful to archaeologists by fusing the benefits of digital photographs (i.e., their low cost, easy storage, and easy duplication) with the benefits of instant photographs (i.e., their nearly immediate production of hard copy). Whether or not these particular products are adequate, however, remains to be seen. Nevertheless, Polaroid's recent cessation of instant films (Polaroid (Press Release), 2008), removes them from the field archaeologist's toolbox and will inevitably force the adoption of new technologies such as portable printers.

well. Likewise, scanning slides for digital projection at lectures has not been problematic.[24] However, scanning large numbers of slides for inclusion in the project database, while not particularly difficult, has proved to be very time consuming.

Fortunately, the intervening years have seen continued improvements in digital cameras. Although most of these improvements have been aimed at point-and-shoot consumer grade cameras (which are generally ill-suited to technical photography), *Canon*, *Nikon*, and the other makers of advanced SLRs have in the past three or four years introduced digital SLR cameras targeted at professional photographers and serious amateurs.[25] These cameras use standard lens mounts, thereby preserving photographers' often considerable investment in high quality and specialty lenses. Currently, these cameras are moderately expensive, costing between $500 and $1500 (and up to multiple thousands of dollars for top-of-the-line models). However, one can be sure that their price will continue to fall over the next few years, even as their capabilities improve.[26] Moreover, when powered by rechargeable batteries, the cost of their consumables is virtually nil—meaning that they could, despite a considerable initial investment, actually save money in a research budget over the long run. In future fieldwork, I plan to eschew film photography entirely, in favor of an all-digital approach. I expect that this will save time and money, both during and after fieldwork. Based on my MHAS experience, other researchers looking to introduce digital photography to their projects may well consider doing so, though it should be noted that medium format stills—particularly on Black-and-White film—still yield the best results for high-definition object and technical photographs, and may, therefore, retain this specialized use for some years to come.

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[24] When I made the decision to abandon Black-and-White film, but keep slide film, slides were still the most common medium for projecting images at lectures. Nowadays, with the drop in price of video projectors and laptop computers, digital slideshows (virtually synonymous with *Microsoft PowerPoint*) predominate. In this respect, when I decided upon slide film, I failed to foresee how quickly slide projection would become obsolete—though this has not been, in and of itself, a problem.

[25] Compare today's availability of such cameras with the situation at the commencement of this project: As late as 1998, a very good (but now terribly outdated) article in the *SAA Bulletin* presented methods for optimizing the use of flatbed scanners—which, at the time, were becoming commonplace in archaeology labs—for scanning actual artifacts (Houk and Moses, 1998). Though the article presents an innovative use of available technology, its results can now be produced easier and faster with digital cameras.

[26] Film's decline in still photography is strong enough that *Nikon* announced in early 2006 their decision to eliminate all but a very small subset of their film cameras and lenses (see `http://www.nikon.co.uk/press_room/releases/show.aspx?rid=201`).

2.2.3 Global Positioning System (GPS)

GPS (Global Positioning System), widely adopted by the general public in the 1990s, has also been a great boon for archaeological surveying. With its worldwide and highly accurate coverage, it has, in effect, allowed researchers to locates sites with precision far exceeding the resolution of most paper maps. This, in turn, has opened up new methods for data collection with greater precision than was previously possible, allowed for tighter integration with databases and GIS (see Subsections 2.2.4 and 2.2.5, below), and improved the geographic data available for CRM. Particularly in the second of these senses, but hopefully in the last as well, GPS has been immensely useful to MHAS research.

In a nutshell, GPS is a dual-use (i.e., military and civilian) system for determining positions on the earth's surface. It was introduced by the US government in 1993–1994, with a constellation of 24 satellites orbiting in a pattern that guarantees visibility of at least four satellites over most of the earth's surface. (As of this writing, the number of GPS satellites has increased to 31.) Each of these satellites transmits a data stream (its *almanac*) encoded with its exact location and exact time, as determined by onboard atomic clocks. Receivers of signals from at least four of these satellites can, therefore, triangulate their position and determine the precise time anywhere on earth. Recent years have seen a proliferation of handheld GPS receivers, typically costing under $150 US, and sold primarily for outdoor recreation. Since all consumer grade GPS receivers have similar features and accuracy, such units are generally adequate for archaeological survey.

There are, however, some important caveats to consider when choosing to use GPS in archaeological survey. Primary among these is an awareness of the multiple kinds of errors which can affect the accuracy of one's readings. Though for consumer grade handheld receivers, technically incapable of resolving positions more accurately than 10–15 meters, most of these errors can be safely ignored, the influence of these error sources is compounded for higher accuracy equipment. With respect to the use of GPS in MHAS, the most serious errors encountered are caused by reflections from cliff faces. Occasionally, when taking readings close to the wadi walls or in narrow side wadis, GPS readings taken would be wildly inaccurate. Typically, these errors would not be noticeable until the points were plotted in the project GIS—but upon plotting, were readily apparent. In these cases, readings were re-taken when the satellite geometry was more favorable. But though this worked well enough for MHAS, there is no guarantee that all projects which have to contend with reflected signals (whether from proximity to cliffs or to tall buildings) will be able to reliably use GPS. Likewise—though it was not a problem for MHAS—projects that have to contend with tree cover may find it impossible to "lock" onto GPS signals.

Since GPS was developed for both military and civilian use, it was designed with measures to deliberately restrict its highest accuracy signals to military and other authorized users. The most widely known of these systems is *Selective Availability* (SA). SA functions by randomly degrading the civilian signal by up to 30 meters in a manner that prohibits rapid averaging of readings—thereby effectively crippling the usefulness of the civilian signal for military purposes such as targeting (which, for obvious reasons, the military wants to strictly control). However, legitimate purposes such as navigation and emergency management found the crippled signal inadequate, so numerous methods were devised to combat SA—including (ironically, since it's a branch of the military) correction signals broadcast by the U.S. Coast Guard. However, in 2000, under pressure from the FAA, and following an annual report on the matter, President Clinton signed an executive order turning off SA.[27] Turning off SA, of course, has greatly improved the accuracy of GPS in archaeological surveys—to such a degree, in fact, that most projects shouldn't need additional methods to improve accuracy (see Yeazel (2000) for a graphical representation of the difference in the precision of recordings made with and without SA).[28] The first two seasons of MHAS, unfortunately, were conducted when SA was still turned on. Time permitting, it would be beneficial in the future to re-record the locations of MHAS sites—including delineation of the

[27] White House Office of the Press Secretary, 2000.

[28] Projects that do need spatial resolution finer than 10 meters can investigate *Differential GPS* (DGPS). Given the proper hardware and software, DGPS can utilize correction signals broadcast from land-based beacons or satellites to improve the accuracy of GPS readings to between 1cm and 1.5m. Use of these signals is free in locations serviced by land beacons, but generally is for a fee in remote locations that are only serviced by satellite. DGPS has proved to be very useful to some projects—for example, it is a backbone of the data-collection strategy of the RASA project (Harrower, McCorriston, and Oches, 2002) and the Medieval Cottam project (Fitts, 2005)—but is not yet mature enough to be an all-purpose replacement for optical surveying.

outlines of the larger sites and some of their features.[29]

One feature which is present on only some consumer grade GPS receivers, but which is particularly useful to archaeologists, is a serial or USB port. Given the appropriate (usually proprietary) cable, and communications software, GPS receivers equipped with data ports allow for two-way communications between the receiver and a computer.[30] In the field, MHAS GPS data were downloaded to the project computer at the end of each day with a variety of commercial and home-built software, and plotted with various GIS and CAD programs.[31]

Though the convenience of exporting one's site coordinates directly to the field computer from the GPS receiver is undeniable, improving both the speed and accuracy with which one can record site coordinates, this is only an incremental improvement to field data collection.[32] On the other hand, the capability of GPS receivers to record track data raises the potential of highly-detailed recording of one's survey coverage. By leaving a GPS receiver turned on while driving to sites or walking between them, the exact path of one's travels is recorded.

Fig. 2.3 shows in orange the cumulative tracks recorded in the 1997, 1999, and 2004 seasons of the MHAS. Though receivers with different capabilities were used in 1997 than in 1999 and 2004, and though the data for some sessions were lost, resulting in gaps in the recorded tracks, this view does show the maximal extent of the survey area, as well as the most frequently traveled routes (such as the main Wādī Ḥaḍramūt trunk road). In Fig. 2.4, two tracks from the 1999

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[29] Moreover, during the 1997 season of MHAS, the GPS receiver used (a *Magellan GPS 2000*) was, by today's standards, slow to acquire an initial "fix" and also was susceptible to the introduction of errors from movement of the receiver. Coordinates of sites recorded in 1997, thus, are doubly suspect.

[30] The most common communication standard is the NMEA1083 (National Marine Electronics Association) protocol. This simple serial protocol returns ASCII strings to the connected computer, which other software—such as the Open Source *GPSBabel* project (`http://www.gpsbabel.org/`)—can then convert into a wide variety of other formats for use in mapmaking and GIS. NMEA sentences consist of a short descriptor and a comma-delimitted data string, and are easily deciphered by the non-specialist. (See Bennett, 2006 for a good overview of NMEA 1083.)

[31] Unless there is a specific reason not to do so (such as the reliance on a base map drawn to a country's own datum or preferred coordinate system), it is strongly recommended that you use the UTM (Universal Transverse Mercator) coordinate system on the WGS-84 datum. WGS-84 is the de-facto standard for GPS recordings, and UTM, since it is an orthogonal grid measured in meters, is easily incorporated into all manner of GIS, CAD, and illustration software.

[32] By the mid 1990s, the unreliability of data input for GIS was noted (Claxton, 1995, pp. 335–336), and has remained a high concern across the last decade (Tripcevich, 2004, p. 17). Electronic collection and transfer of data, as is possible with GPS equipment, largely obviates these concerns.

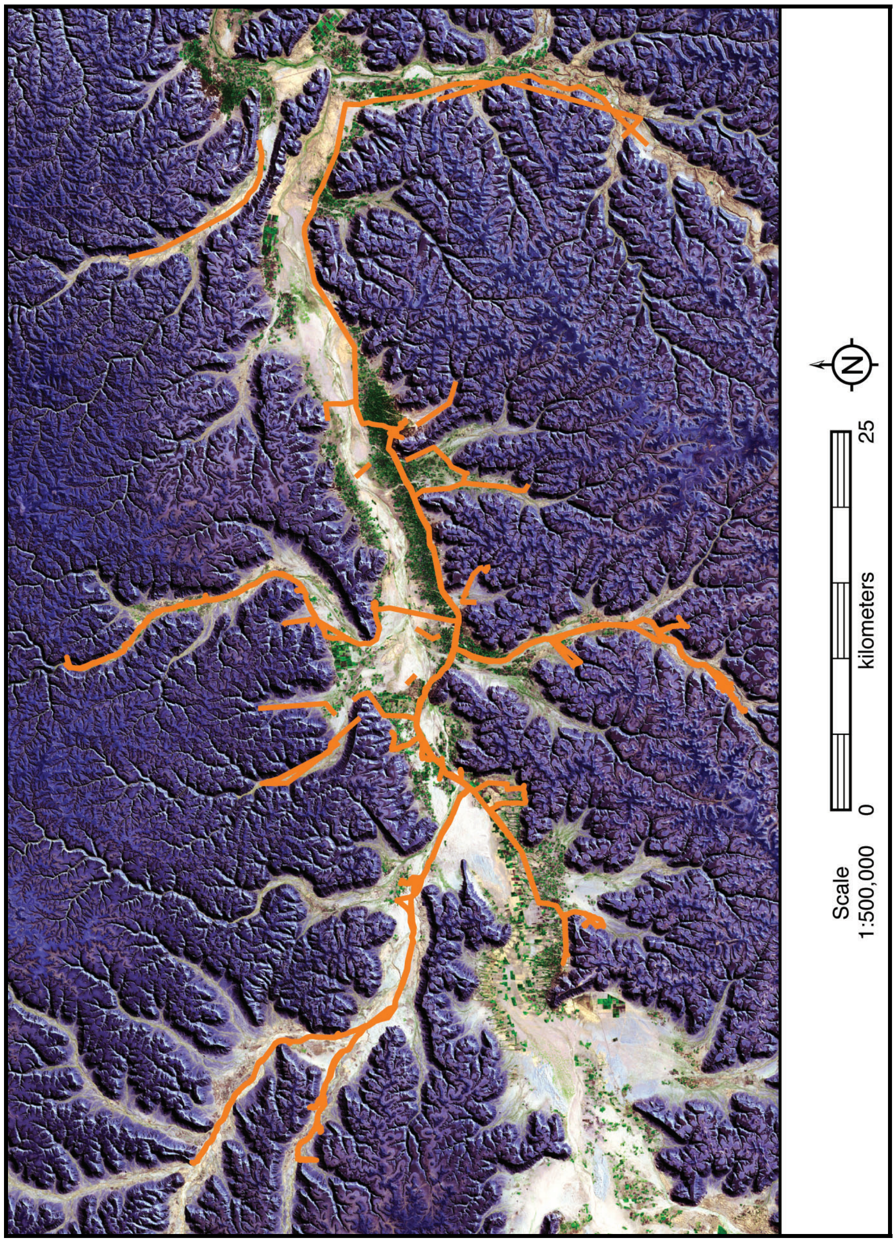

Figure 2.3: GPS recordings of the tracks taken during the 1997, 1999, and 2004 seasons of the MHAS.

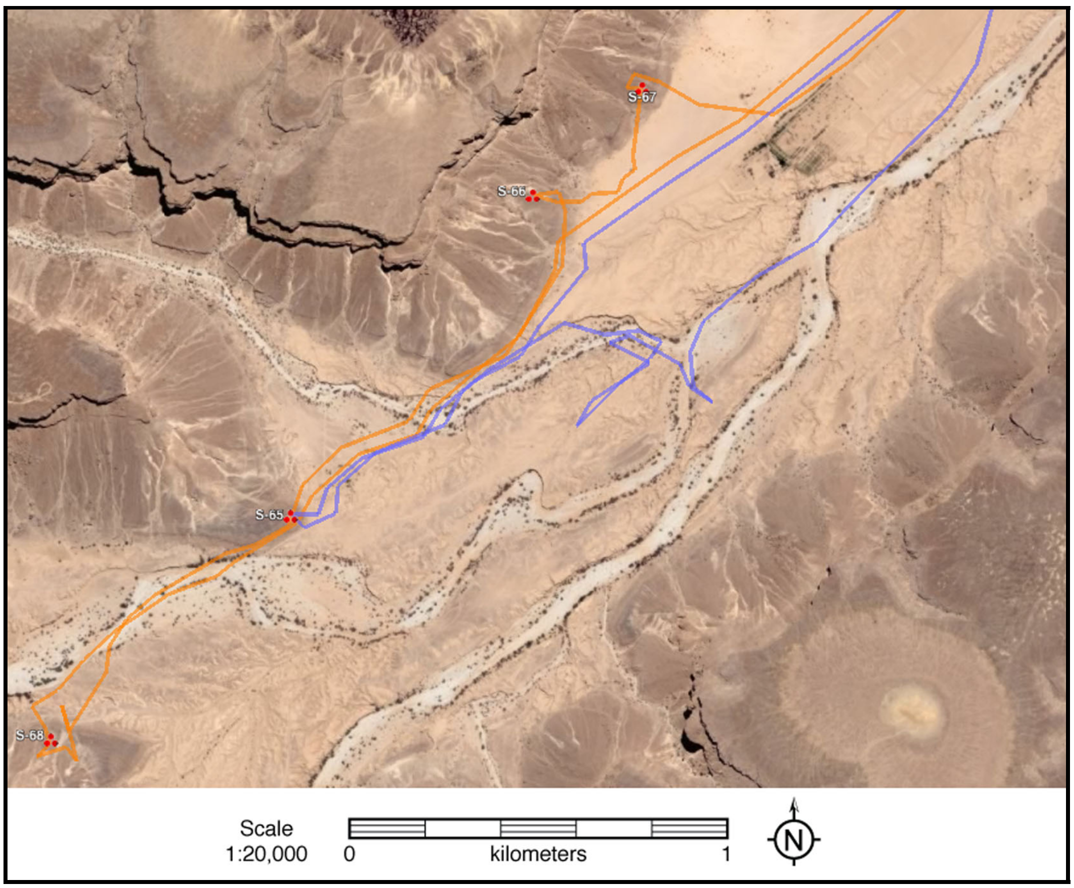

Figure 2.4: GPS recordings of the tracks taken into and out of Wādī Bin ʿAlī on two days in 1999. The blue track shows our path on October 18th, and the orange track shows the route taken on the 19th.

MHAS field season are recorded. Because only one GPS receiver was used by the MHAS team, the tracks in Figs. 2.3 and 2.4 mix modes of transportation, with faster vehicular transportation showing less fine detail than slower pedestrian survey. (Compare the straight tracks at the upper right of Fig. 2.4—showing our movement, by truck into and out of the wadi—with the winding tracks near the sites.[33])

Ideally, multiple GPS receivers would be used by a survey project, each one devoted to a particular task. In this manner, all tracks from a given receiver would (for example) record vehicular transport, whereas all tracks from another receiver would be records of pedestrian survey—thereby simplifying full documentation of the survey methods employed. Moreover, multiple receivers could also be used to record the tracks of individual surveyors, which would be especially useful when walking transects.[34] In such a manner, in addition to equipping the surveyors with the ability to record immediately the locations of interesting finds, the path and speed of each surveyor would be noted, and direct evidence for the proper separation of transects could be presented. The need for such recordings has already been noted,[35] and though this level of detail is certainly too overwhelming to be of practical day-to-day use, it would serve well to document effective coverage or expose gaps in coverage. Employed in experimental archaeology or as a pilot project for a longer-term field survey, it could also be used to tailor the optimal speed and spacing of transects to satisfy particular research designs.

2.2.4 Geographic Information Systems (GIS)

GIS (Geographic Information Systems), as a tool, was introduced to archaeology in the late 1980s, and saw increasing acceptance through the early 1990s. By the time of the initial planning of this project in 1996, the major strengths and weaknesses of GIS were well published, and many

[33] The erratic tracks near S-68, at the southern end of the image, are due to cliff echoes. Unlike static GPS readings, which can sometimes be corrected with averaging, tracks are especially susceptible to erroneous readings caused by environmental interference. The possibility of such errors should be acknowledged and accounted for by researchers recording GPS tracks.

[34] Eiteljorg and Limp, 2007, p. 140.

[35] Ebert, Camilli, and Berman, 1996, pp. 26–27.

projects had adopted the tool—sometimes as a central component of their research design. Thus, with my decidedly computer-centric approach approach to data collection and management, it was a given that GIS would comprise a major component of this survey. A project GIS, however, was never intended to be *the* primary product of this work. Instead, it was always supposed to be a tool for the collection and analysis of project data.

Despite this disclaimer, however, the generally poor availability of detailed large-scale maps of the Wādī Ḥaḍramūt has provided the impetus for much of the adoption of the cartographic tools of GIS by the MHAS.[36] The explicit intent was to produce high-quality computerized maps from the project's survey data combined with whatever satellite images were procured, and distribute them from the MHAS project website (`http://www.lugal.com/mhas/`) upon the completion of this thesis. These maps have since been released publicly under a Creative Commons license (see `http://www.creativecommons.org/`), in the hopes that they will be adopted by other interested parties.[37]

Among the various paper maps of the Wādī Ḥaḍramūt, perhaps the most easily obtained map of large enough scale to be useful for our purposes is the 1:250,000 scale supplement to Van der Meulen and von Wissmann's original edition of *Ḥaḍramaut: Some of Its Mysteries Unveiled*.[38] This map, though wildly inaccurate in its portrayal of the wadis' contours contains very useful documentation of the settled areas, place names, and some archaeological sites, as they existed in the early 20th century (see Fig. 2.5) . The update to this map, compiled a quarter century later, contains many corrections to the base map, additions from other researchers' work, and corrections to the transliteration of place names.[39] Copies of the updated map can still be purchased for a

[36] Harrower (2002), working farther east in Hadramawt Governorate, noted both the unavailability of sufficiently-detailed maps and the capacity for satellite imagery and GPS, through the use of GIS tools, to create suitable base maps for the RASA project's purposes. Faced, in its early stages, with the same challenges as the MHAS project—namely, inadequate base maps—our respective solutions are very similar. The detail with which they went on to use their GIS data, especially in the classification of landforms, however, far exceeds its use in the MHAS.

[37] Throughout the course of the MHAS fieldwork, digital copies of processed satellite images have been provided to the staff of the Sayʾūn Museum upon request. Through the website, however, they are now available anonymously and to a wider audience.

[38] Van der Meulen and von Wissmann, 1932.

[39] von Wissmann, 1958a; von Wissmann, 1958b; Serjeant, 1958.

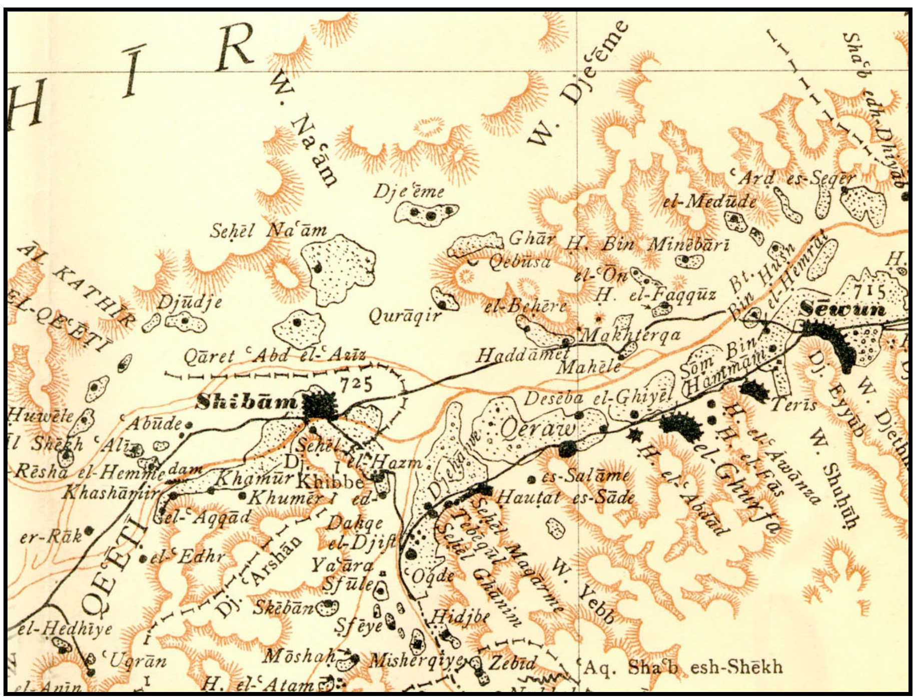

Figure 2.5: Detail of von Wissmann's 1932 map of the Ḥaḍramūt, showing the area around Šibām and Say'ūn.

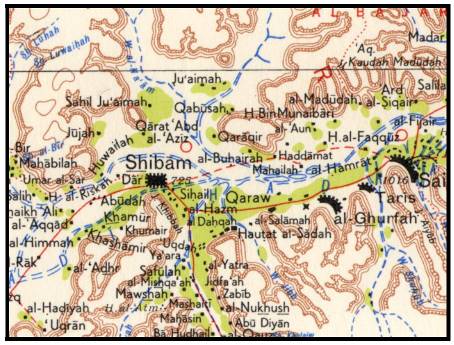

Figure 2.6: Detail of von Wissmann's 1958 map of the Ḥaḍramūt, cropped to the same region as Fig. 2.6.

nominal fee from the Royal Geographical Society (Map 3003). Unfortunately, however, this maps is printed at 1:500,000 scale—too small to serve as a base map for archaeological survey, and its depiction of the wadi's contours, though better than the previous version, is still unreliable (see Fig. 2.6).

Two additional high-quality large-scale paper map series covering the Wādī Ḥaḍramūt, though difficult to obtain, can be found in the AIYS library. The first of these, the product of the Soviet Integrated Geological Survey of the Western Part of the PDRY, at 1:100,000 scale, is useful for its relatively high detail as well as its Arabic place names (as opposed to the transliterations usually found on Western maps).[40] The second of these map series is a 1:250,000 scale plan created by the Yemeni Ministry of Oil and Mineral Resources in 1990.[41] Unfortunately, both of these map series were found at the end of the 2004 field season, and so were not available as references during the conduct of most of the MHAS fieldwork. A third set of topographic maps, at 1:100,000 scale, was apparently created from aerial photographs in the late 1950s by the RAF. To this date, however, I have failed to find copies of these maps.[42]

[40] Anonymous. The map sheets of this series which cover the MHAS study area are D-39-1, D-39-2, D-39-3, E-39-133, E-39-134, and E-39-135.

[41] Ministry of Oil and Mineral Resources, Oil & Mineral Corporation, Mineral Exploration Board, 1990. The map sheets of this series which cover the MHAS study area are 15J and 16J.

[42] The maps in question are apparently Series K667, Sheet 1548B, Edition I-GSGS. As mentioned above, however, I have not been able to verify this information.

In addition to these aforementioned paper maps, satellite imagery can also serve as adequate base maps for archaeological survey, especially when processed with GIS software. Fortunately, since the commencement of the MHAS project, the availability of good satellite imagery has steadily improved. Initially, the acquisition of Landsat, SPOT, and Corona imagery—the classes of imagery that were known to cover the MHAS study area—were prohibitively expensive. The project, therefore, relied on low-resolution copies and details of the full-resolution images found on internet searches. In 2004, however, while in the field, the project received a copy of a Landsat TM from the RASA project.[43] This newly-acquired image, with its 30m spatial resolution, was significantly more detailed than any other maps on hand, and immediately became the new base map for the project. At about the same time, a DTM (Digital Terrain Model) of unknown provenance was given to me. Combining the elevation model onto the Landsat data enabled the creation of interesting visualizations. Unfortunately, neither the quality of the elevation data of the DTM nor the resolution of the Landsat image were sufficient to create useful GIS analyses such as viewsheds, cost surfaces, or spectral signatures that could be used to locate sites. Nevertheless, the precision with which GPS data could now be mapped, as well as the visual appeal of the resulting maps were radical improvements over what was previously possible.

Upon return from the field, an SRTM (Shuttle Radar Topography Mission) terrain model was purchased outright from personal funds to replace the DTM previously acquired.[44] Shortly thereafter, this image, a Landsat TM image nearly identical to the one acquired by RASA,[45] and a similar Landsat ETM+ image,[46] were all released into the public domain.[47] Each of these data sets was immediately procured and incorporated into the MHAS GIS, the newer Landsat TM dis-

[43] Landsat TM (LT5163049050087021), 1987.

[44] USGS (2004), Shuttle Radar Topography Mission, 3 Arc Second scenes SRTM_ff03_n015e048, SRTM_ff03_n015e049, SRTM_ff03_n016e048, and SRTM_ff03_n016e049, Filled Finished-A Version 2.0, Global Land Cover Facility, University of Maryland, College Park, Maryland, February 2000.

[45] NASA Landsat Program, 2004, Landsat TM scene p163r49_5t19900910, USGS, Sioux Falls, 10/9/1990.

[46] NASA Landsat Program, 2004, Landsat ETM+ scene p163r049_7x20001015, Orthorectified, USGS, Sioux Falls, 10/15/2000.

[47] These data sets can be downloaded from the Global Land Cover Facility (GLCF) at `http://www.landcover.org`.

placing the older one, and the newer SRTM displacing the older DTM.[48] At this point, a relatively complete set of legally obtained and inexpensive satellite data was available for GIS and cartography. But since these events took place after the completion of fieldwork, they had no impact upon the conduct of fieldwork. Nevertheless, the extensive processing of these images will make them suitable for use by future researchers.

GIS, however, comprises a toolset that extends beyond digital cartography,[49] having become a catch-all term for spatially-referenced databases.[50] Neubauer's recent definition, though not especially concise, captures the practical essence of the term:

> Geographical information systems can be described as a system of complex computer hardware and software, and geographical data, which enables the identification, distribution, manipulation, analysis and storage of all possible types of geographically referenced information. A GIS is not simply a computer system used to create maps, although it is able to produce them in various scales, coordinates, projections, etc. It does not only store maps or pictures of a geographical region, but all relevant data that can be used to solve a particular problem. It is a spatial data base.[51]

This conception of GIS as a toolset and workflow that, at its core, is simply a spatial database is broadly shared among archaeologists. Because of this project's regional focus, GIS has been employed by MHAS to handle data sets on a regional scale—but it is also at the regional scale that GIS is most frequently employed by archaeologists. Limp explains this as a function inherent to GIS and CAD software,[52] but some projects have nevertheless attempted with varying success to apply GIS tools and analyses to the site-level, especially during excavation.[53]

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[48] Since the completion of this project's GIS work, improved versions of the SRTM data have been released by the Consultative Group for International Agriculture Research Consortium for Spatial Information (CGIAR-CSI), for free download from `http://srtm.csi.cgiar.org/`. These data are indexed though an innovative Google Earth interface, and I highly recommend that researchers needing SRTM data use this source, rather than any of the less intensively processed SRTM data sets.

[49] Savage, 1990, pp. 22–23.

[50] Maschner, 1996, p. 2.

[51] Neubauer, 2004, p. 161.

[52] Eiteljorg and Limp, 2007, p. 23.

[53] See, for example, Levy, Anderson, Waggoner, Smith, Muniz, and Adams, 2001.

Early adopters of GIS, predictably, saw it as a tool with the potential of revolutionizing archaeological fieldwork as deeply as radiocarbon has.[54] Regardless of its transformative power, the intrinsic need for mapping in the conduct of archaeological fieldwork, the amenability of spatial analyses to archaeological data, and the capacity of GIS programs to deal with large amounts of spatial data have all contributed to its widespread adoption.[55] But the very factors which led to its adoption also led to criticism of GIS and its practitioners as overly concerned with landscapes.[56] Some have argued that it has yielded few new ways of dealing with archaeological data,[57] whereas others have noted the troubling tendency toward environmental determinism.[58] More subtly, however, GIS's application in archaeology has been criticized for its very spatial focus—which in the absence of a diachronic understanding of the cultural patterns behind GIS data sets can lead erroneous (or at best partial) conclusions.[59] At the risk of sounding flippant, the primary use of GIS by the MHAS project—as a cartographic tool—largely obviates these concerns. However, had GIS been used in this project in the full manner that it was originally intended, surely it would have been open to such criticisms.

Processing Satellite Imagery

Second only to GPS data collection, GRASS has been the most useful tool for the MHAS GIS. GRASS, for the uninitiated, is a popular GIS suite, originally created by the U.S. military, but now maintained as Open Source software (see `http://grass.itc.it/`). GRASS is popular among archaeologists because it is freely available, mature, robust, and supports both vector and raster data types (this last point is in contrast with many of the most popular commercial products, which are primarily vector or raster based and require additional add-on packages to support the other data type). Though widely-used, GRASS does suffer some significant shortcomings: being Open

[54] Zubrow, 1990, p. 67.

[55] Gaffney, Stančič, and Watson, 1995, p. 211.

[56] Biswell, Cropper, Evans, Gaffney, and Leach, 1995, p. 269.

[57] Ebert, Camilli, and Berman, 1996, pp. 25–26.

[58] Eiteljorg and Limp, 2007, p. 134.

[59] Wheatley, 1998, p. 4.

Source and dependent on a myriad of other Open Source software libraries, there are multiple distributions of varying quality; lacking a commercial backer, product support frequently means mailing lists and web searches; and many graphics operations run slowly, as they are not optimized for modern computer hardware. These drawbacks and its steep learning curve notwithstanding, the fact that it is free software allows for the interested researcher to experiment and test to see if the software is an appropriate tool for the intended project. In this manner, GRASS was adopted for the MHAS project GIS, displacing *MFWorks*, a commercial product that was employed in the 1999 season but, because of its lack of scriptability or support for vector data failed to adequately meet my needs.[60]

GRASS is very well suited to processing Landsat data, and has excellent tools for importing, combining, and transforming the images' multiple bands. Though importing Landsat data into GRASS is not necessarily a simple process, it is straightforward enough with the documentation provided by the *r.in.gdal* program. After importing, the multispectral bands were combined and sharpened against the panchromatic image with the *i.fusion.brovey* program to produce a visually appealing and meaningful base map. GPS data—tracks and waypoints—were then imported, and the base map was georectified against these data (choosing, as the reference points, readings taken on prominent features that were easily identifiable in the Landsat image).[61] Finally, SRTM data were imported and used to create contour maps comparable to the best available paper maps. Though a tedious process involving extensive trial-and-error, it is hoped that the instructions provided below (see Appendix C) will give future researchers a jump start.

Each new data set incorporated into the MHAS GIS brought with it noticeable improvements to the quality of the project base map. The Landsat TM image, with its 30m resolution was dramatically better than the small-scale maps previously used; the Landsat ETM+ image, with its

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[60] In addition to GRASS, there are a number of other competing Open Source GIS and image processing applications. Perhaps the most interesting of these is *Quantum GIS* (`http://www.qgis.org/`), which successfully combines relative ease-of-use with direct access to GRASS data sets and tools. It is hoped that continued development will bring this product closer to the goal of an easy, powerful, and modern GIS platform.

[61] A simple *awk* script for converting the NMEA-like data from a *Magellan* GPS receiver into a tabular format suitable for importing into GRASS with the *v.in.ascii* program is available online at `http://www.lugal.com/mhas/custom_pages/magellan2grass.awk`.

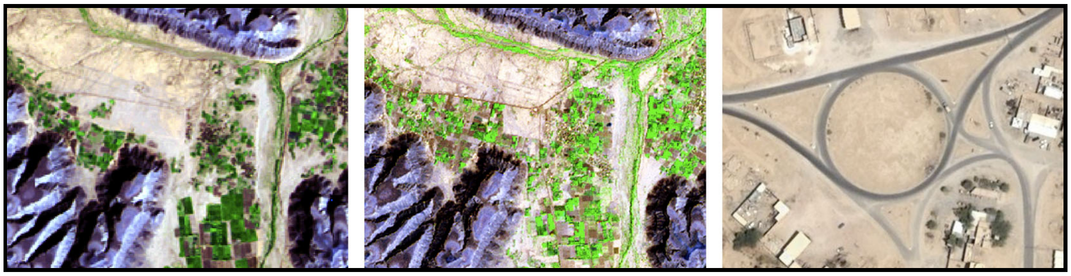

Figure 2.7: Comparison of the resolution of Landsat TM, Landsat ETM+, and QuickBird images at the confluence of Wādī ʿIdm and Wādī Ḥaḍramūt. In the first image (Landsat TM), the main roads are discernible, but only the E–W trunk road is clearly visible. In the second image (Landsat ETM+), zoomed to the same area as the Landsat TM image, the roads are clearly visible, including the traffic circle. The third image (QuickBird) is zoomed into the traffic circle to show vehicles, buildings, and the roads disappearing into the sand. Clearly, the greater detail of the QuickBird image opens possibilities for remote site detection that were previously not possible.

15m resolution revealed details not visible in the Landsat TM image; and the SRTM data were smoother than the previously obtained DTM, with fewer processing artifacts. But by far the most dramatic addition has been the QuickBird imagery that was made available through the Google Earth program (`http://earth.google.com/`) in 2006 (see Fig. 2.7). Prior to the release of these data through Google Earth, images of this quality (having a resolution as fine as 0.7m) would have been exorbitantly expensive, whereas they are now freely and easily available to anyone with a reasonably fast internet connection. Most of the MHAS study area is now covered by these QuickBird images, and those that are not are covered by the same Landsat ETM+ image that the MHAS had already begun using.[62]

Upon its release in 2005, Google Earth quickly captured popular and archaeological interest. It offers users a free, fast, and easy (if somewhat sparse) GIS. In its free version it lacks most of the sophisticated features of full-blown GIS programs such as image math, georectification, and database integration, but excels at ease-of-use and internet integration, is cross-platform, and

[62] In comparing satellite imagery for the Upper Euphrates, Comfort found that a combination of SPOT and KVR1000 imagery—the latter having roughly the same resolution as QuickBird imagery—yielded the best results for identifying sites, whereas Landsat imagery was only useful for regional analyses, and not suitable for finding individual sites (Comfort, 1997). These results apply equally in the Wādī Ḥaḍramūt.

Figure 2.8: Comparison of the resolution of different base maps in Google Earth. The right half of the image is one QuickBird scene (DigitalGlobe Catalog ID 101001000501BD01); the lower left quadrant is another (DigitalGlobe Catalog ID 1010010002AAA401); and the upper left quadrant is a Landsat ETM+ image (Landsat ETM+ p163r049_7x20001015). The QuickBird images were taken over two years apart and in different seasons. (Note the different color of the fields where they are split by the two QuickBird images.) The fact that these widely differing sources are presented in the same scene, with no easy way for the user to selectively view only chosen sources, is a serious demerit against the use of Google Earth for scientific purposes.

data sets can be shared easily.[63] It is also extremely fast and, as it automatically downloads georeferenced images, eliminates the need for the researcher to find and purchase satellite imagery. Google also offers paid versions of the program with additional capabilities beyond those of the free version.[64] A number of articles have already been published by and for archaeologists wishing to explore the uses of this product, though these are susceptible to becoming quickly outdated by software that is so frequently updated.[65] Google Earth, however, is not without two significant shortcomings: as the user does not control the base images used, these are liable to change without any forewarning (see Fig. 2.8); and an internet connection—preferably broadband—is needed to use the program effectively.

Prior to the addition of the high-resolution QuickBird imagery, Google Earth was simply an entertaining toy, without any real value for the MHAS project. However, with this new imagery, Google Earth has suddenly become the best tool on hand for finding sites and checking the accuracy of the field data (see Fig. 2.7), particularly in concert with the GPS data import capability of Google Earth Plus.

Fig. 2.9 shows a side-by-side comparison of the sketch map (M-27) of site S-58 with a QuickBird image of the same site, obtained from Google Earth. The correspondence of the map and the satellite imagery is quite good, especially with regards to the site's shape and major features, but a closer inspection is actually quite instructive. (*A*) indicates the large cairn, the most prominent feature of the site, and clearly visible in the satellite image. (*B*) indicates the location of the GPS reading. The map shows its actual location, on the southwest slope of the cairn, but the satellite image shows it 25m to the southeast. This discrepancy is most likely due to SA, but may also be indicative of an error in the georectification of the QuickBird image. Because the researcher has no input into the georectification of Google Earth imagery (as opposed to images used in, for example, GRASS), we cannot know whether the image could have been georectified better. (*C*)

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[63] I have posted my GPS data in a Google Earth-compatible format, for free download from the project website.

[64] For this project, I have purchased yearly licenses for Google Earth Plus, which adds GPS integration to the basic version.

[65] See, for example, Ullman and Gorokhovich (2006) for a good introduction to the program's capabilities.

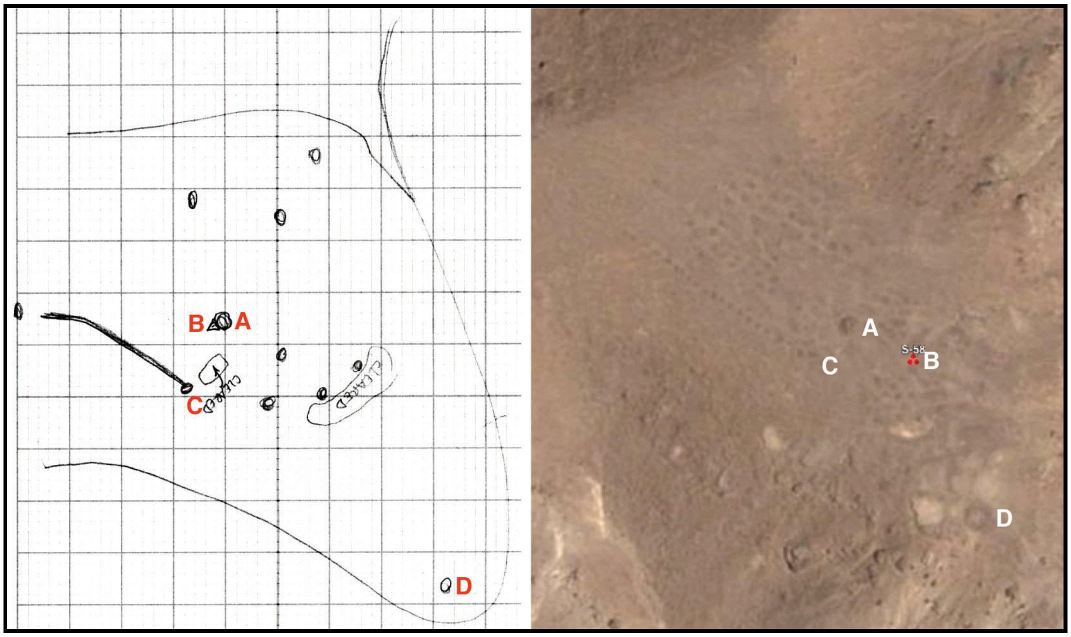

Figure 2.9: Comparison of sketch map (M-27) and QuickBird image of site S-58. See text for explanations of the labels.

indicates a line of small piles of stones. Whereas the alignment is clearly visible in the satellite image, it is merely marked as a dark line in the sketch map. Because the construction of the alignment was not adequately described in the field notes and incorrectly drawn in the map—certainly an expedience taken in the field—memory of this feature's construction (as a series of distinct piles, rather than one continuous line) was forgotten until the QuickBird image was viewed. Lastly, (*D*) marks a stone ring at the southern end of the site. In the sketch map, there is no indication that this is a ring, rather than a cairn. By these examples from a single site, we see that the satellite imagery provides a useful correction to the sketch map, a sort of post-field ground proofing that was never so easily attained as with is now possible.

Another favorable comparison between sketch map and QuickBird image is seen in Fig. 2.10. Here we see a very good correspondence between the two images, the most glaring discrepancy being the roughly 30° difference in their alignment. This error was most likely caused by a misread compass, but the site's overall shape and its major features, as recorded in the sketch map, are confirmed by the satellite image. Especially noteworthy is the location of the GPS reading, which

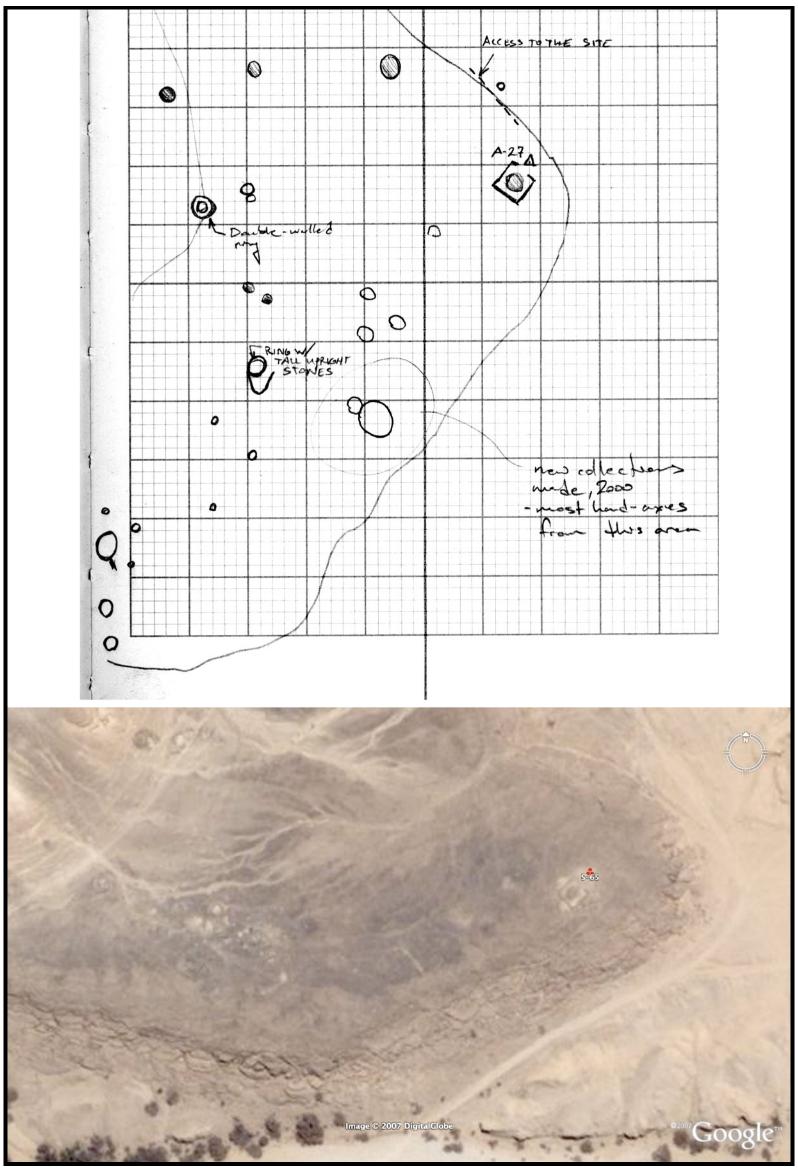

Figure 2.10: Comparison of sketch map (M-32) and QuickBird image of site S-65.

Figure 2.11: QuickBird imagery of site S-34. See text for explanations of the labels.

in both images is easily seen directly to the northeast of structure A-27. As with the previous example (Fig. 2.9), here we see the use of easily and freely obtained imagery for post-field ground proofing.

Beyond simply confirming the accuracy of my field notes and sketch maps, Google Earth imagery has also been used to correct and augment the field data. For example, site S-34 is noted in the site database as simply an isolated kiln site, not unlike many currently in use throughout the wadi. However, the QuickBird image obtained through Google Earth (Fig. 2.11) shows a probable settlement site (highlighted in red) directly to the north, unnoticed by us in the field. Moreover, the actual location of the GPS reading (*A*) is probably 17m to the west of that indicated in the image (though this is not at all certain, from the satellite image); there are also a series of mounds (*B*) that may be the remnants of abandoned irrigation works; and there are a number of wells (*C*) clearly visible in the satellite image, but unnoticed at the time of our visit. In light of these newly-discovered features, future study should investigate this area to determine whether or not this is a site, and if so to make collections so as to determine its nature. The proximity of S-34 to a nearby town suggests that the site may soon be overrun by urban expansion.

2.2.5 Project Database

As archaeologists, with their predisposition to mapping data, have widely adopted GIS, their need to tabulate large bodies of physically descriptive data has also driven their adoption of computer databases. The MHAS, as an intentionally computer-centric endeavor, naturally followed suit. In particular, though, a central component of this project was to explore the use and development of a project-specific database management system, especially with the hopes of prototyping a system which, with minimal modification, could be adopted by other projects. Though the intent, among many similarly computer savvy archaeologists, to create a universal database system—one which could be used by any excavation—has been voiced for some time[66] and dismissed as folly by others for nearly as long,[67] the great majority of such systems have been tailored to handle one single project, with no deep concern for wider adoption.[68] A site database (or an object catalog, or a specialist's database) has become a regular feature of practically all excavations, and presumably the vast majority of surveys. The MHAS database, in all its permutations, therefore is atypical in its wider aspirations.

Archaeological data, frequently collected on pre-printed project-specific forms and presented in tables, is particularly amenable to importation into a database. The amount of planning that precedes the creation of those forms, especially with an eye toward the uniformity of data input (including terminology and spelling) and comprehensiveness of the recording process, of course improves the ease and accuracy with which paper forms can be transfered to computer databases. Effective databases, however, typically need careful checks on data normalization and integrity. As these concerns are highly technical, inattention to them can put limits to the long-term viability of the project database. Lacking a database programmer—one who understands the archaeological materials and processes—most projects' databases eventually run into limits of their own design

[66] Arroyo-Bishop and Lantada Zarzosa, 1995.

[67] Eiteljorg, 2005.

[68] To the extent that any dispute exists between those who would like to create a universally-applicable system and those who are against it, the difference is primarily one of resource allocation. The former would like to try, knowing full well that the task is daunting, whereas the latter feel that, though a laudable goal, it is technically and politically impossible.

as database fields get modified and added through the life of a project. Thus, even where there is an underlying intent to create a system with wide-ranging applicability, the technical hurdles exposed in the regular use of a given system on a single project may preempt any attempts to port it to another project.

This said, well designed forms, whether computerized or paper-based, are certainly useful tools. A well designed set of field forms closely matches the intended database design, thereby improving the correspondence, accuracy, and speed with which field data can be entered into a computer database. The RASA project, for example, while it is very dependent on computerized GIS and mapping, uses a series of bilingual (English and Arabic) paper forms for much of its primary data collection. These forms group types of data pertinent to the project's research design and provide convenient and comprehensive references for the kinds of data that are to be collected by the survey team. Similarly, the PGT excavations have used a custom set of forms as a front-end to a computer database back-end, for the analysis of material collections, especially ceramics.[69]

As paper forms, the RASA field forms carry the advantage over most computer forms in that they are accessible in the field—but they also carry the disadvantages of physical size, weight, and fragility (loss or destruction by fire, wind, or rain, for example). As with the above discussion of digital versus film photography, any paper-based collection system, if it is to be a front-end to a computer database, requires a digitization step. While well-designed forms can simplify that process, it will always be tedious, time consuming, and prone to error—so attempts have been made at fully electronic workflows.[70] By recording field data in handheld computers, such projects hope to eliminate the digitization step (and any errors inserted by that step). Many archaeologists, however, still feel the need to record some observations longhand, sometimes with accompanying sketches. Such free-form data collection, even when it is accounted for by a fully formulaic and digitized collection strategy, is nearly impossible to accommodate without the raw digitization

[69] See Joukowsky and D'Agostino, 1998, for a description of the PGT database. Note that though I have had no part in the development of this or the RASA systems, I have been privileged to witness their use in the field (hence, their specific mention here), and have incorporated elements of those systems into the current discussion. I would especially like to thank Joy McCorriston for providing me with copies of the RASA forms as examples for my own studies.

[70] See, for example, Harlan, 2000.

(scanning to an image file) of the notes. These drawback to paper-based data collection notwithstanding, for the MHAS (as a project wherein all aspects of data collection were performed by a single researcher), I chose to use a form-less, paper-based field data collection system with nightly data input into the project database.

One approach to creating a universally applicable archaeological database management system is to accommodate all datatypes in the schema. This is the approach taken by the Nabonidus Archaeology project,[71] and the OCHRE project's underlying ArchaeoML XML definition.[72] Both are explicitly web-enabled technologies, but whereas the former focuses on structural comprehensiveness (with an eye toward the statistical analysis of entered data) and process managment, the latter project establishes a more flexible, hierarchical model of archaeological data ("OCHRE does not force projects to use a predetermined nomenclature and it does not impose a rigid mode of organizing information"). In this respect, the MHAS database, though comparatively sparse, is conceptually similar to the OCHRE project.

The MHAS database, as it now stands, is composed of a semi-hierarchical collection of related tables, each representing a type of archaeological object ("object" in a broad and classificatory sense, not necessarily physical objects) joined to multiple tables of metadata objects in many-to-many relationships. In the hierarchy of MHAS database objects, the primary unit is the site, each of which is a discrete non-nested object.[73] Within sites, there are bag objects representing the collections taken at a site. Bags are grouped by material, and multiple bags may exist for a given site, but they are also discrete and non-nested objects. Architecture exists one level below bags, as discrete non-nested objects contained by sites.[74] Also below bags are objects, a database table holding information of all non-ceramic collections, and parallel to the objects table is the ceramics

[71] Microsoft Research, 2007.

[72] Schloen, 2006.

[73] This reflects the primary focus of the MHAS research design upon the identification of sites. Siteless, landscape, or intersite surveys could well have a different primary unit of analysis.

[74] Finer-grained data collection that what was actually done on the MHAS could potentially nest bags within architecture in those cases where collections are made within the walls of a building—but such a scheme could quickly become confusing with structures variously serving as both discrete objects and collection units.

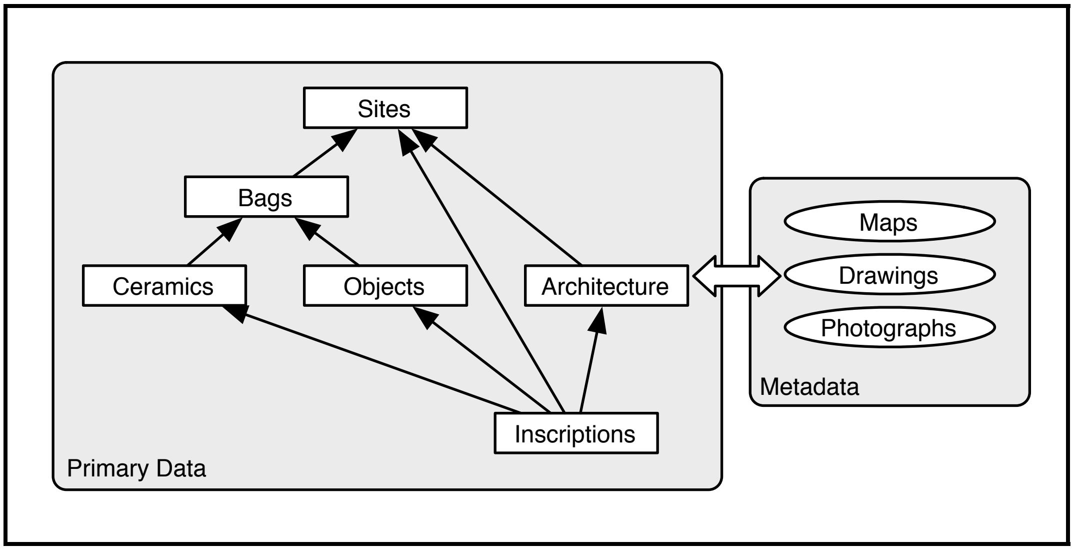

Figure 2.12: Organization of the MHAS database tables. Primary tables are semi-hierarchical. Metadata tables are linked to primary data tables in many-to-many relationships.

table, holding records for all sherds collected.[75] Next, there is a table for inscriptions. These are somewhat difficult to account or because they are dependent upon their host surface, and are perhaps rightly considered attributes of the other tables. Thus, in the MHAS database, inscriptions may be tied to sites, architecture, objects, or ceramics. Lastly, three types of metadata tables are included: maps, drawings, and photographs. Each of these metadata objects has at least one other database object as its subject, and can potentially have multiple such objects (a single photograph, for example, of all the sherds in a bag). Naturally, each subject may also be represented in multiple metadata objects (such as a coin that is photographed and drawn on its obverse and reverse, giving a minimum of four linked metadata records.) In addition to these primary database tables, there are a number of auxiliary tables that serve to maintain data integrity and facilitate the many-to-many lookups.

Given the organization of the MHAS database presented above, we can abstract the structure so as to be widely applicable to other projects (see Fig. 2.13.) . In doing so, we easily obtain a structure as follows:

[75] Note that if, for example, a substantial number of coins were collected, a separate table for coins could be cleaved from the objects table with minimal disruption to the rest of the database.

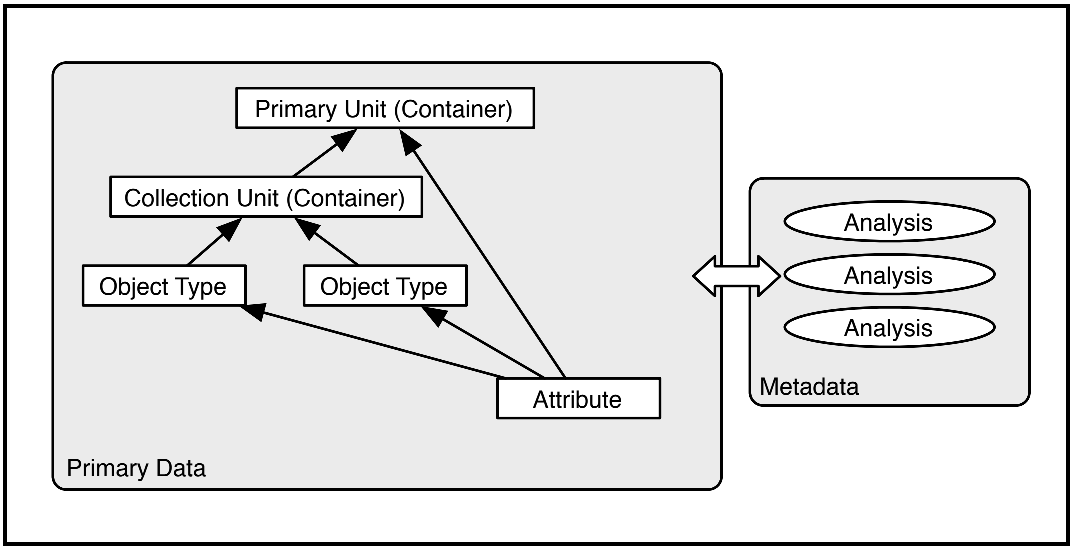

Figure 2.13: An idealized representation of the MHAS database structure, abstracted for general applicability to other surveys. Except for the container table representing the primary unit of analysis, there can be an arbitrary number of other tables at each level, and object tables can function as containers for lower-level object types when necessary for the research design.

- A top-level container representing the primary unit of analysis. For the MHAS, this is the site, but depending on the survey methodology, landform, quadrant, feature, or any other large enough unit, real or arbitrary, could serve.

- Secondary levels of discrete containers, each of which is wholly contained by the primary unit of analysis. Multiple parallel or nested container tables could be present in a particular project, again dependent on the survey methodology.

- A tertiary level of objects, each of which is discrete and contained by only one container object. Multiple parallel tables of such objects could be accommodated by the database schema, but measures must be taken (via an established protocol for the project, perhaps enforced programmatically) to permit the splitting and joining of object tables as necessary.

- An optional level of attributes which could be applied to tables in any of the higher levels. (In the MHAS design, inscriptions operate as such. These could also have been represented by fields in each of the sites, architecture, objects, and ceramics tables, but were cleaved off as their own table because of their perceived importance. As applied here, then, object instances with inscriptions become conceptual containers for those inscriptions.)

- Multiple tables of metadata which could be related, in many-to-many fashion, to the primary tables.

In arriving at its current state—still, admittedly, a work in progress—a number of working prototypes of the MHAS database were created. The initial database, used in the 1997 season, was created with *FileMaker Pro*. Though the basic organization of the tables used then has been retained throughout, their conceptual interrelation was drastically re-thought for the 1999 season, and the current system is an evolution of that used in 1999. The single greatest change since the 1999 season has been the abandonment of *FileMaker Pro* as the database platform. Following the 2001 season, all the project's data were migrated to a *MySQL* database, with a custom-built web-based front-end written in the *PHP* programming language. At the time, the limitations of *FileMaker*—particularly its weak relational model—were well known, and it was felt that the adherence to this platform was impeding the further development of the MHAS database as an experimental model. *MySQL* and *PHP* were chosen because of their growing popularity. Though these tools were certainly adequate, future database development will focus instead on migration to the *PostgreSQL* platform for its stricter SQL syntax and better handling of characters in foreign scripts.[76]

Though, as I have stated repeatedly, much of the impetus for developing the MHAS database was to explore a system that could be adapted to other projects, I am grudgingly beginning to accept Eiteljorg's criticism of such attempts.[77] Inter-project comparison of data sets, while still a noble goal, seems now even more remote. I am confident that the overall system that I created (the general structure of the database back-end, plus the standardized way that it creates web pages from its data) are easily and widely adaptable to other projects. Unfortunately, however, that very adaptability—the customization that it so readily accommodates—runs exactly counter

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[76] *PostgreSQL* is also attractive for the *PostGIS* extension (see `http//postgis.refractions.net.`), which enables it to store GIS objects and tie into GIS managers such as GRASS.

[77] Eiteljorg, 2005.

to any hopes of inter-project comparison. The recent interest in XML has rekindled the hope of developing archaeological database systems that facilitate inter-site and inter-project comparisons and analyses[78]—and I see the development of schemas and namespaces (such as ArchaeoML, mentioned above) as a positive step in this direction. Rapidly maturing XML tools such as XPath, XQuery, and a bevy of new XML database platforms all bode well, but their widespread adoption, as a communication tool between projects, will depend on the formulation of a basic set of terminology for archaeological data collection—clearly a herculean task (and an interesting topic, itself, but beyond the scope of this thesis).[79]

2.2.6 Electronic Publication

Compared to the thorny practical and theoretical issues confronting effective database development, the decision to publish electronically is relatively easy. Given the wide variety of forms which electronic publication can take, the rapidly improving software, and the growing demand for electronic publications, a solution (or set of solutions) that fits a particular project's goals can be easily obtained. From its inception, the MHAS project has always presupposed digital publication. So, from electronic documents to informational websites to database access, the MHAS project has experimented with the major forms of electronic publication, and gleaned information which will be useful to other researchers.

Whereas, above, I am somewhat dismissive of word processing, its impact on archaeological fieldwork has been profound. Indeed, it can greatly improve fieldwork by providing fellow researchers and antiquities authorities, alike, with attractive, legible, and easily-reproduced site reports immediately upon the completion of a season's work. This point was made abundantly

[78] See, for example, Kilbride, 2005.

[79] Faced with the unwillingness of paleoanthropologists to adopt common database formats—especially when each project has developed its own specialized database schema—RSS (an XML standard for aggregating web content) has recently been proposed as an intermediate format for sharing their data sets (Kamrani, 2008). Whereas I feel that RSS is a poor format for this purpose, the basic idea of a common data interchange format bears further exploration. By establishing a standard format, each individual archaeological project could use whatever database schema best fits its research goals, methods, and workflow while still providing a means for the sharing of data sets between projects. Though not without its own set of problems, this focus on a standardized interchange format, rather than a standard database schema, should speed adoption of a system that facilitates the sharing of data between projects—which is the ultimate goal of recent efforts to devise universally applicable database designs.

clear upon the completion of the MHAS 1997 pilot project, when the season report was presented to Yemen's Director of Antiquities, who was delighted to see digital photographs interspersed with the text. (The site report for the Jūjah excavation,[80] submitted just two years earlier, and written with more primitive word processing software, relied on sheets of color prints pasted in by hand, to much poorer effect.) All MHAS word processing documents are now also saved as *Adobe* PDF (Portable Document Format) files, submitted to the GOAM in paper form and on CD, and posted on the project website.

Subsequently, however, this thesis and the most recent reports have been written with LaTeX, a typesetting language. This was chosen over more common word processors because of its ability to handle multiple languages and its support for indexing and features such as variables, which are not available in most word processors. As a kind of programming language, LaTeX is clearly not suitable for most archaeologists, but the advanced capabilities imparted to it by its programming metaphor permitted the development by me of a system for typesetting Musnad text (see Appendix B).[81]

Though, as a typesetting language, LaTeX has been in use (mostly by mathematicians) for nearly three decades, recent versions typically produce output in the popular PDF format. Originally developed by *Adobe* with published and publicly accessible specifications, PDF has been submitted to the ISO for approval as an open standard, which it is expected to gain.[82] This bodes well for archaeologists because (as opposed to typical word processing formats) an open standard provides a measure of long-term viability and accessibility to electronic documents saved in its format.[83] PDF is also a particularly useful format for archaeologist because it can include fonts, and retains the intended formatting of the original document. Because word processing documents

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[80] Hansen, 1995.

[81] Though beyond the scope of this present work, it is my intention to refine my Musnad extensions to LaTeX and release them publicly.

[82] Adobe (Press Release), 2007; King, 2007.

[83] Eiteljorg (2007, pp. 21–22) promotes the use of application-specific (and proprietary, if necessary) formats, with conversion to open formats, as a means of retaining long-term accessibility of documents. PDF documents generally fit this mold, as they are not editable documents in and of themselves, but usually electronic representations of printed output from other programs (usually word processors).

are representations of paper based media (and are usually printed to paper for distribution), PDFs' formatting fidelity ensures that electronic documents (and their later printouts) faithfully reproduce the original document, regardless of the operating system or the absence of a particular font on the host system. This fact greatly increases the document's viability over plain word processing documents—and for this reason I urge all researchers to create PDF files of their reports.

Another concern for archaeologists who work with multiple languages and multiple scripts is the encoding of characters. In brief, to counteract the multiplicity of incompatible encodings for different languages' character sets and writing direction, there has been a widespread adoption in recent years of the unicode standard (see `http://www.unicode.org/`). Unicode aims to be an all-encompassing superset of the other character sets, with room to accommodate diacriticals, combining characters, symbols, and ancient alphabets—features which are of immediate use to many archaeologists.[84] Though ASCII encoding is sometimes proposed for long-term longevity and archivability of documents,[85] its miniscule character set is only useful for some Western European languages, rendering it unsuitable for many types of technical work. PDF's support of unicode enables it to represent characters of any language in the unicode table, further strengthening its usefulness to archaeologists.

Beyond simple representations of the printed page, however, the last decade has seen the widespread adoption by archaeologists of web publishing. Project websites typically serve two functions: to dispense information and to promote the project, and successful examples can be readily found.[86] The MHAS website (`http://www.lugal.com/mhas/`) was designed to be a publicly accessible information source, but its primary focus has always been to be a front-end to

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[84] There is a standing proposal to encode Musnad in the unicode tables which, unfortunately, has yet to be ratified (Everson, 1998).

[85] See, for example, Westcott, 2002.

[86] I am personally fond of the design of the UTARP website (`http://arcserver.usc.edu/`) and the Arabia Antica website (`http://arabiantica.humnet.unipi.it/`)—the former being a good example of a single project's site, and the latter being a clearinghouse site for multiple related projects, with an excellent online catalog of South Arabian inscriptions (`http://csai.humnet.unipi.it/`). The Open Context project (`http://www.opencontext.org/database/browse_summary.php`), too, demonstrates the willingness of certain high-profile excavations to post their data in a publicly accessible and searchable database. (Incidentally, Open Context is built upon the foundation laid out by the OCHRE project, mentioned above.)

the project database (along the lines of the DigMaster website [see `http://www.cobb.msstate.edu/dig`]).

Though neither an originally intended format for the publication of the MHAS project data nor an originally intended interface for the project database, the paradigm shift in the early 2000s that transformed web publishing from static hyperlinked pages to dynamically generated displays of database content presented a compelling case for developing a project website and developing it as the primary interface for the project database. Through an intensive and iterative process of refinement, in tandem with the project's database back end, the current website serves as my own preferred method to browse my data, as well as a tightly integrated component of the overall database design (which, as described above, should be relatively easily transferred to another project). The data in the following chapters were organized and categorized through searches carried out in the web-enabled front end of the project database, and the publicly available version is exactly the same as the version carried locally on my computer. Particularly useful is the ability afforded by the website to "drill down" into the data to find (for example) the drawings of all the sherds collected on a given site—saving hours of tedious manual sorting and looking-up of paper documents by referring instead to their digitized and database-linked representations in the computer (see Fig. 2.14).

Another aspect of the MHAS project database that warrants further enhancement is the display of archaeological periods to which a given record may be assigned. Currently, the project does this with (coarse grained) "boat hull" diagrams showing the expected likeliness that a given object or site falls in certain periods, generated automatically from values stored in the site database (see Fig. 2.15). The difficulty of encoding periodization data in an archaeological database has recently been commented upon,[87] but there is as yet no ready solution for dealing with multiple periodization schemas, lacunae, overlapping time periods, or scholarly disagreement. There is also no ready way of spreading or concentrating the degree of certainty as one moves up or down between relatively finer and coarser periodization schemas—showing, for example, that a given

[87] Eiteljorg and Limp, 2007, p. 97.

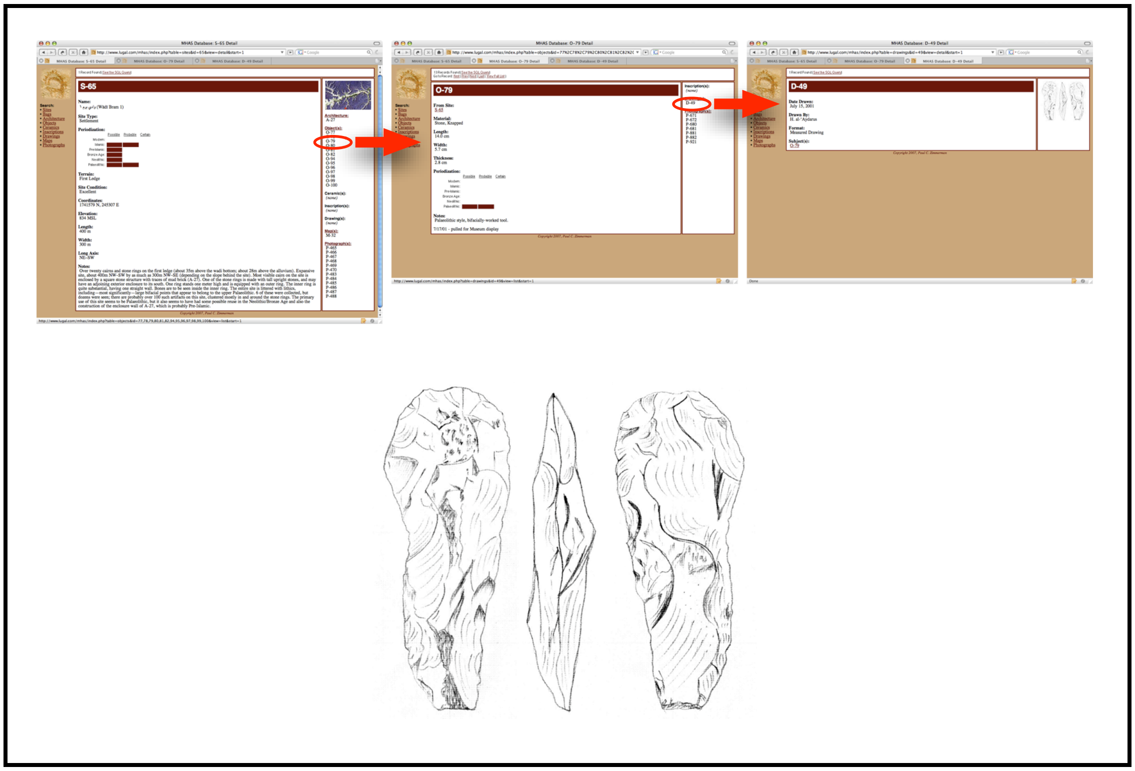

Figure 2.14: Example of “drilling” into linked data on the MHAS website. We can browse database records from site S-65 to object O-79 to drawing D-49, eventually finding the scanned drawing, itself, by clicking links on each page.

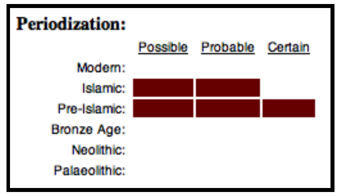

Figure 2.15: Periodization chart of site S-46, showing that aspects of the site certainly date to the Pre-Islamic, and others are likely dated to the Islamic period.

sherd possibly belongs to Raybūn Level IV or Level III at one level of chronological resolution, but certainly Pre-Islamic or Iron Age by other chronological periodizations. The particular solution adopted for the MHAS database, crude as it is, has been extremely useful, and it is expected that it can form the nucleus of a new system that addresses these broader concerns.

Chapter 3

Sites

Sites were visited, and data were recorded during the 1997, 1999, and 2004 seasons of the MHAS. In addition, a number of other researchers, unaffiliated with MHAS, have also traversed the region, noting the presence of archaeological sites, and in some cases conducting substantial research upon them. Brief descriptions of these sites, MHAS and other, are presented below.[1]

3.1 MHAS Sites

3.1.1 Sites from the MHAS 1997 Season

In 1997, site reconnaissance was concentrated in the area around Šibām, including Wādī Nām, Wādī Jaʿaymah, and the northern end of Wādī Bin ʿAlī. Additional sites were also visited during the arrival to Wādī Ḥaḍramūt, along the road leading up from Mukalla and through Wādī Dūʿan. (See Fig. 3.1.)

S-1 السفيل (as-Safīl)

GPS Coordinates: *(no readings taken)*

Two Pre-Islamic town sites on the road from Mukalla into the Wādī Ḥaḍramūt. Both sites were documented by the SoYCE expedition.[2] These sites lie outside of the MHAS study area, but were visited in 1997, and given a MHAS site ID number at that time. They will, however, not be included in further discussions of MHAS findings, except as comparanda.

S-2 لقلات (Liqlāt)

GPS Coordinates: 1725867 N, 217441 E

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[1] More complete descriptions of the sites, including additional photographs, maps, and documentation, can be found on the project's online database at `http://www.lugal.com/mhas/`.

[2] Sedov, 1996a.

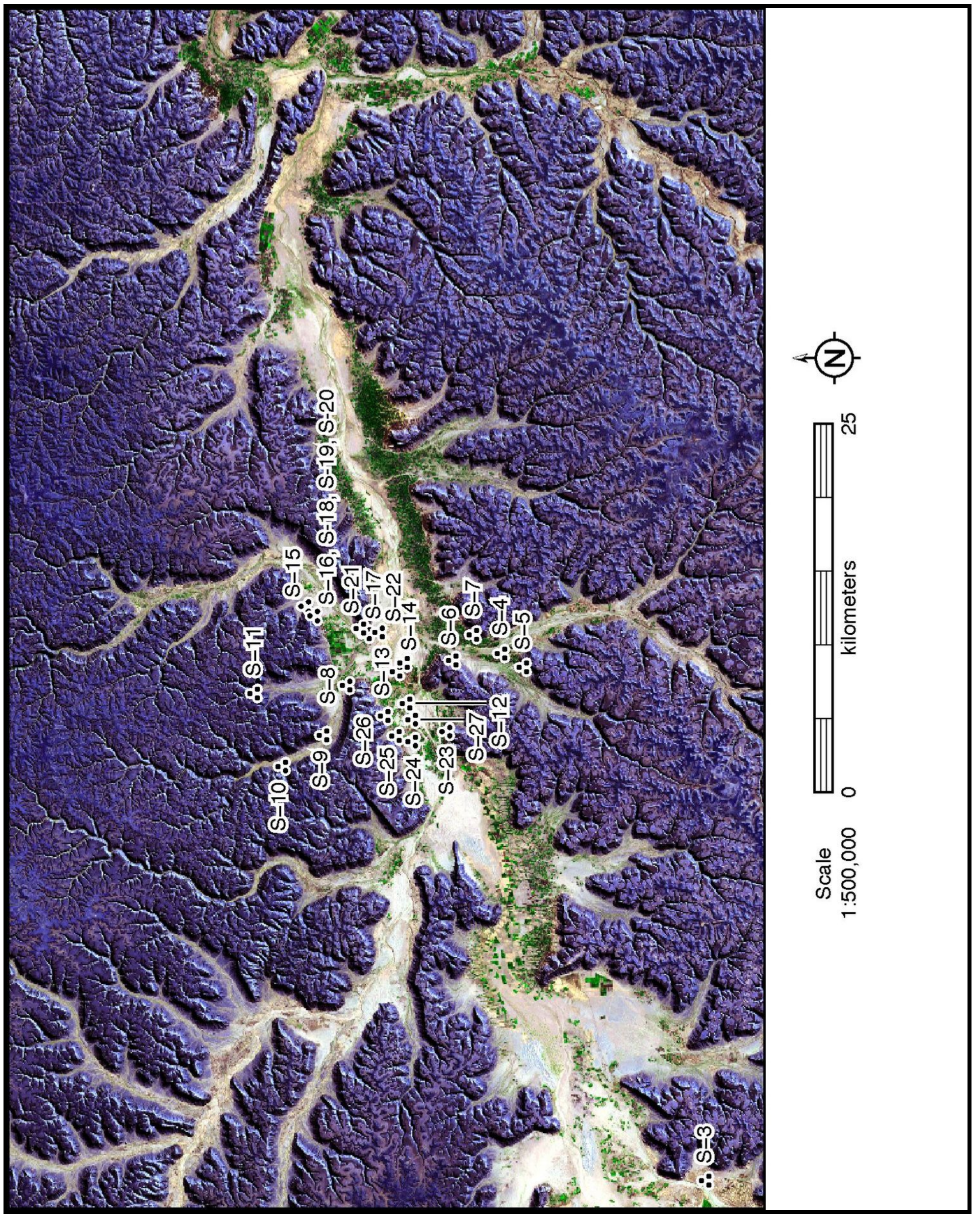

Figure 3.1: Sites visited in the 1997 MHAS field season.

A Pre-Islamic settlement on the road from Mukalla into the Wādī Ḥaḍramūt, near S-1. This site was documented by the SoYCE expedition.[3] Pre-Islamic ceramics were collected by us for comparanda, and the site was given an MHAS site ID. However, as the site lies outside of the MHAS study area, it will not be included in further discussions of MHAS findings, except as comparanda.

S-3 عادية غنيمة بن عقيل (ʿĀdīyyat Ġanīmat Bin ʿAqīl)

GPS Coordinates: 1742563 N, 211769 E

A Pre-Islamic village in the Wādī Ḥaḍramūt. Mostly robbed for agricultural soils. At least two building levels are visible in section, and there is much chipped stone present at the surface.

S-4 سموعة (Samūʿah)

GPS Coordinates: 1756399 N, 247519 E

This is not a clearly defined site, but rather a number of features, possibly related, that were uncovered in Wādī Bin ʿAlī following a sayl in 1996. Building walls are visible in places, but with no discernible ground plans. There is also a section of large stone wall, probably part of an ancient dam (see Fig. 3.2). Following the sayl, bones were found by men from the nearby village, who claimed that they were from one or two burials. These, however, could not be confirmed. Upon the discovery of this site, materials were brought to the Sayʾūn Museum by the museum staff. These materials, as well as ceramics collected in 1997, were given MHAS catalog numbers for inclusion in this study.

S-5 حصن العطّن (Ḥiṣn al-ʿAṭṭan)

GPS Coordinates: 1754904 N, 246558 E

[3] Sedov, 1996a.

Figure 3.2: Overview of S-4, looking north, with the probable dam in the foreground.

This is a fairly recent lookout located on a scree slope within Wādī Bin ʿAlī. The structure is preserved up to 4 meters, at its highest point, and is constructed of mud brick walls on stone foundations. Turrets are built into the corners of the structure (see Fig. 3.3), and there is a staircase and retaining wall on the slope below it. Many ceramics were collected at this site.

S-6 GPS Coordinates: 1759695 N, 247048 E

This is a large boulder on the wadi bed. Figures, including sheep, ibexes, and mounted riders, are painted in red on the south and west faces of the stone (see Fig. 3.4). Two inscriptions (I-23 and I-24) are found here. I-23 is a faintly pecked and indecipherable Musnad incription (probably a personal name), and I-24 is a personal name (بن سنر) in faded red paint.

S-7 حصن الرباكي (Ḥiṣn ar-Rubākī)

GPS Coordinates: 1758295 N, 248786 E

Figure 3.3: Interior of the southeast turret of the structure at S-5.

Figure 3.4: Painted animals on south face of boulder at S-6.

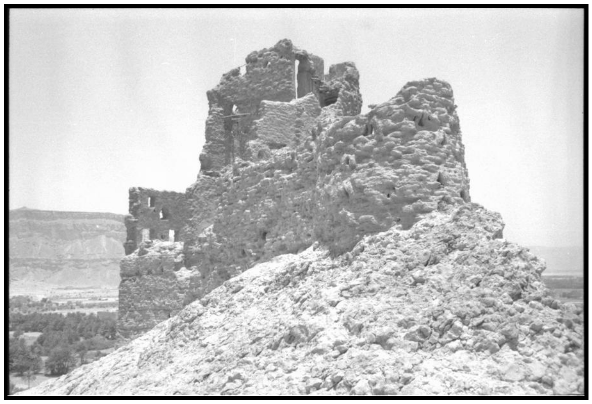

Figure 3.5: Overview of S-7, facing northwest.

These are two adjoining structures on the slope of the eastern side of the mouth of Wādī Bin ʿAlī. Both structures are of mud brick with stone foundations (see Fig. 3.5). There is a well immediately to the east of the structures. One of the buildings has a turret in its southeast corner, whereas the other building has square corners.

S-8 قرية عبد العزيز (Qaryat ʿAbd al-ʿAzīz)

GPS Coordinates: 1766882 N, 245332 E

A large boulder on the wadi bed, at the bottom of the slope to the north of the village of Qaryat ʿAbd al-ʿAzīz (see Fig. 3.6). Numerous pecked Pre-Islamic and Islamic inscriptions are on this stone—two of of the former, though mostly illegible, are cataloged as I-25 and I-26. Other inscriptions were not cataloged because they were too faint to read or photograph.

S-9 GPS Coordinates: 1768439 N, 241961 E

A stone mound on the wadi bed. By comparison to other cairn sites, it is reasonable to expect that this is anthropogenic. However, given later seasons' work, it is doubtful that this feature would warrant being given an MHAS site ID, as no collections were made and the cairn, itself, is unremarkable.

Figure 3.6: Overview of S-8, facing north.

Figure 3.7: Overview of S-10, facing southeast. One of the cairns is visible in the foreground.

S-10 GPS Coordinates: 1771256 N, 239857 E

Approximately five stone mounds, each about one meter in diameter, on the wadi bed at the end of Wādī Nām (see Fig. 3.7). A number of potential lithics were collected, but were determined in 2004 to be natural. Given subsequent site reconnaissance in the Wādī Ḥaḍramūt, this site no longer warrants being recorded with an MHAS site ID.

S-11 GPS Coordinates: 1773161 N, 244798 E

A stone ring of indeterminate age on the wadi bottom at the northern end of Šiʿb Ṣahaybah.

S-12 GPS Coordinates: 1762839 N, 244110 E

A small tell site consisting of at least two mud brick buildings. The site has been mostly

Figure 3.8: Overview of S-12, facing southwest, showing bulldozer cut.

Figure 3.9: Overview of S-13, facing south toward Šibām.

cleared by bulldozer to make room for an adjacent field, leaving the building's walls visible in section (see Fig. 3.8). The structures abut, and are founded on a small rise. The original ground level is evident in section, as are at least three earlier flood levels.

S-13 GPS Coordinates: 1763484 N, 246264 E

A large settlement site on the alluvium to the north-northeast of Šibām(see Fig. 3.9). Many mounds are visible, each one probably the remains of a single dwelling. Ceramics and glass collected suggest a primarily Islamic occupation, but there may also be some Pre-Islamic component to the site, as is suggested by the discovery of object O-12, which is said to have come from here.

Figure 3.10: Overview of S-14, facing southeast toward the mosque.

S-14 مسجد با علوي (Masjid Bā ʿAlawī)

GPS Coordinates: 1763002 N, 246886 E

A small cluster of mud brick structures to the northeast of Šibām, named for a nearby mosque. Five or six small house mounds with exposed walls are visible (see Fig. 3.10).

S-15 GPS Coordinates: 1769605 N, 250378 E

A cluster of features on the lower scree slope and wadi bottom in Wādī Jaʿaymah. Two rectangular stone structures, apparently the foundations of buildings from which the superstructures have been lost (see Fig. 3.11). The smaller of the two structures is built against the side of a large boulder. The boulder, itself, has painted figures—including, perhaps, mounted riders. Aligned along a ridge at the northern end of the site are a series of small circular cairns terminating in a stone circle on the wadi bottom.

The larger structure at S-15, A-23, is approximately 8 meters N–S by 7 meters E–W, and aligned to the cardinal points. An interior wall bisects the building on its central E–W axis. There is a doorway in the western wall, entering onto the southernmost room, and another doorway in the western end of the interior wall, providing access to the northernmost room. The cobble foundations of the northern wall are preserved to 1.5 meters high. Traces of decayed mud brick are evident on the surface around A-23, and the foundations are covered

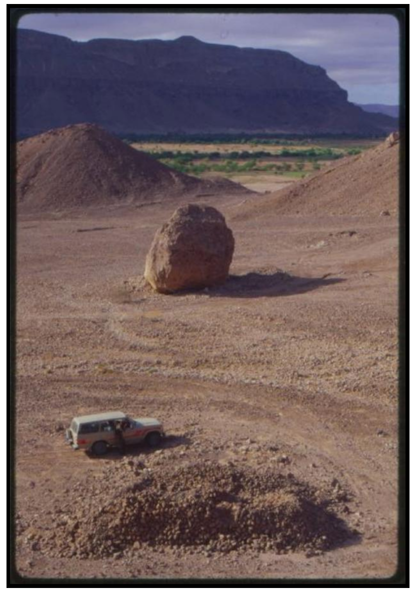

Figure 3.11: Overview of structures A-23 (foreground) and A-34 (beneath boulder) at S-15, facing south.

in a thick layer of small stones and pebbles—presumably chinking stones and others that were once mixed into the matrix of the mud brick, but deposited onto the remaining structure when the mud dissolved (see Fig. 3.12).

S-16 سحيل جعيمة ١ (Saḥīl Jʿaymah 1)

GPS Coordinates: 1768943 N, 249918 E

A small single-room building (A-35) on top of a spur immediately to the east of site S-18. Stone foundations and decayed mud brick are visible, as is the presence of reed matting at the northern end of the structure.

Figure 3.12: Western face of structure A-23 at site S-15. Note the accumulation of debris from the building's superstructure atop the remaining foundation stones.

Figure 3.13: Structure A-35, facing south, with part of S-18 in the background.

Figure 3.14: Northern end of long wall at S-17, facing southwest.

S-17 قبوسة ١ (Qabūsah 1)

GPS Coordinates: 1765576 N, 248796 E

This is an exposed stone wall, traceable about 50 meters, N–S, in the alluvium. The wall, probably a check dam, is well constructed of large, roughly shaped stones (see Fig. 3.14).

S-18 سحيل جعيمة ٢ (Saḥīl Jʿaymah 2)

GPS Coordinates: 1768914 N, 249826 E

A multi-period settlement on the wadi bottom, overlooked from the east by S-16 and from the north by S-19. Approximately ten relatively recent mud brick houses on stone foundations are found here, as are two modern, though apparently abandoned, kilns (see Fig. 3.15). Furthermore, up to seven small rectangular structures similar to those from S-15 and one possible cairn are found here.

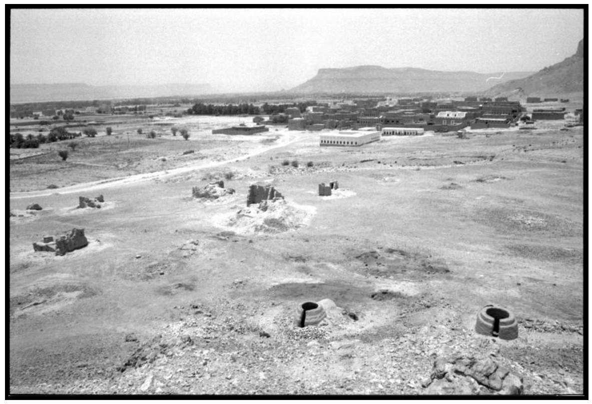

Figure 3.15: Overview of S-18 from S-16, facing southwest.

Figure 3.16: Cairn at S-19, facing south, with S-16 (on the spur) and S-18 (on the wadi bottom) in the background.

S-19 سحيل جعيمة ٣ (Saḥīl Jʿaymah 3)

GPS Coordinates: *(no readings taken)*

Twenty or more stone mounds, two caves, and stone terracing walls on the scree slope. This appears to be a necropolis, and may be related to S-18, which it overlooks (see Fig. 3.16).

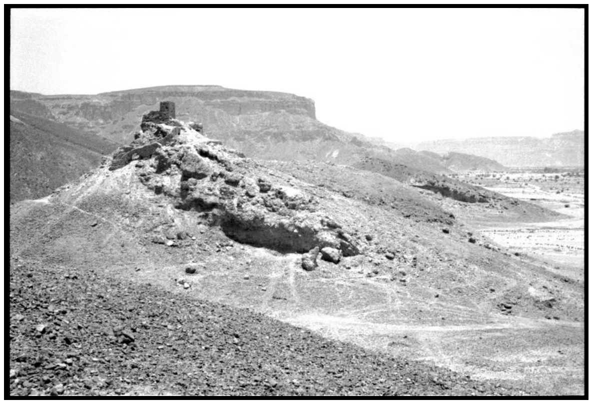

Figure 3.17: View of S-20 from S-16, facing northeast.

S-20 سحيل جعيمة ٤ (Saḥīl Jʿaymah 4)

GPS Coordinates: 1769085 N, 250043 E

Castle (A-36) on the spur to the east of S-16. Mud brick walls with stone foundations, and turrets in both the northeast and southeast corners of the structure. A staircase leads up the western slope. The building's central tower and terrace walls are intact (see Fig. 3.17). A possible cave is also found in southern slope of spur.

S-21 قبوسة ٢ (Qabūsah 2)

GPS Coordinates: 1765963 N, 249199 E

A cave site with an illegible inscription (I-27) carved into the top surface of its mouth (see Fig. 3.18).

S-22 قبوسة ٣ (Qabūsah 3)

GPS Coordinates: 1764714 N, 248923 E

A stone structure, approximately 20 meters N–S by 5 meters E–W, on the alluvium (see

Figure 3.18: Mouth of cave at S-21, facing east.

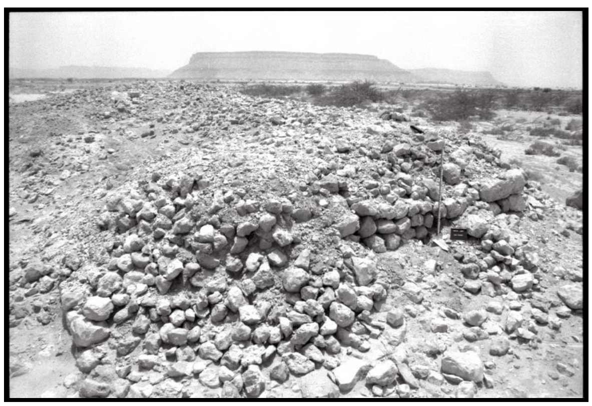

Figure 3.19: Overview of structure at S-22, facing southwest.

Fig. 3.19). No collections were made.

S-23 خشامر - بئر علي ١ (Ḫašāmar / Biʾr ʿAlī 1)

GPS Coordinates: 1760147 N, 242404 E

A village site on the wadi bottom, and extending a short distance up the scree slope, on the

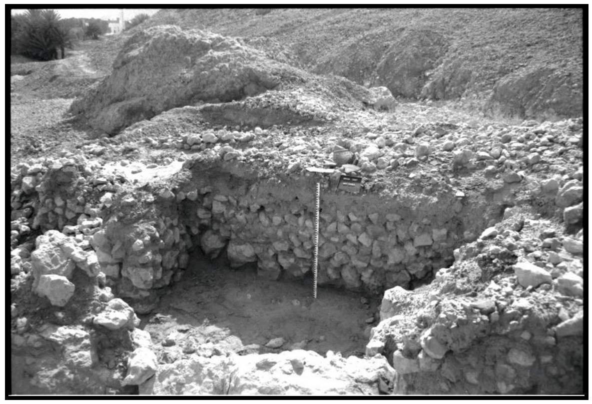

Figure 3.20: Interior of structure at S-23 where inscribed zir sherds were found, facing northeast.

southern side of the Wādī Ḥaḍramūt, between the villages of Ḫamūr and Ḫašāmar. The site has been bulldozed for modern agricultural fields, but has been unplanted since prior to its discovery in 1997. Some stone foundations are visible at the northern end of the site, but most of the site's architecture has apparently been destroyed. The high density of surface ceramics suggests that the site was approximately 200 meters E–W by 50 meters N–S in its original extent. A large cave, in which human bones were supposedly discovered (though are no longer evident), is found in the slope to the south of the site. Ceramics from this site are uniformly Pre-Islamic, including two inscribed zirs (C-1/I-17 and C-2/I-18), which were found, *in situ* within the walls of the aforementioned structure (see Fig. 3.20). Dressed and inscribed limestone plaques, found on the ridge immediately to the west of the site, strongly suggest the presence of a hillside temple. Recent mining, however, has destroyed the temple's foundations.

S-24 جوجة ١ (Jūjah 1)

GPS Coordinates: 1762438 N, 241553 E

A small multi-period Pre-Islamic tell site, excavated in 1994 and 1995 by NYU.[4] It was visited by MHAS in 1997 and 1999 to assess its preservation subsequent to excavations. (Prior to the NYU project, nearly a third of the site had been robbed for agricultural soils, and I wished to confirm that such activity had not been resumed.) Typical Ḥaḍramī-style farmhouses were found here as well as a platform temple founded upon the walls of an earlier shrine (see Fig. 3.21). Published ceramics from S-24 form the basis for this project's seriation of Pre-Islamic pottery. As the project's surveyor, a detailed topographic map was made by me of the site and its immediate environs (see Fig. 3.22).[5]

S-25 GPS Coordinates: 1763565 N, 241915 E

A mud brick building with stone foundations on a small spur in the wadi near the village of Jūjah (see Fig. 3.23). One stone on the site carries two small and indecipherable Musnad inscriptions, I-51 and I-52.

S-26 جوجة ٢ (Jūjah 2)

GPS Coordinates: 1764300 N, 243261 E

Three to five mounds, each probably the remains of a single structure, on the wadi bottom. This site was mapped by the French survey in 1978 (see Subsection 3.3.7, below), and by the NYU survey in 1994.[6] Two inscriptions (I-28 and I-29) were found on blocks—apparently

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[4] Hansen, Ochsenschlager, and al Radi, 2004.

[5] Hansen, Ochsenschlager, and al Radi, 2004, Figs. 1 & 2.

[6] Hansen, 1994, p. 10.

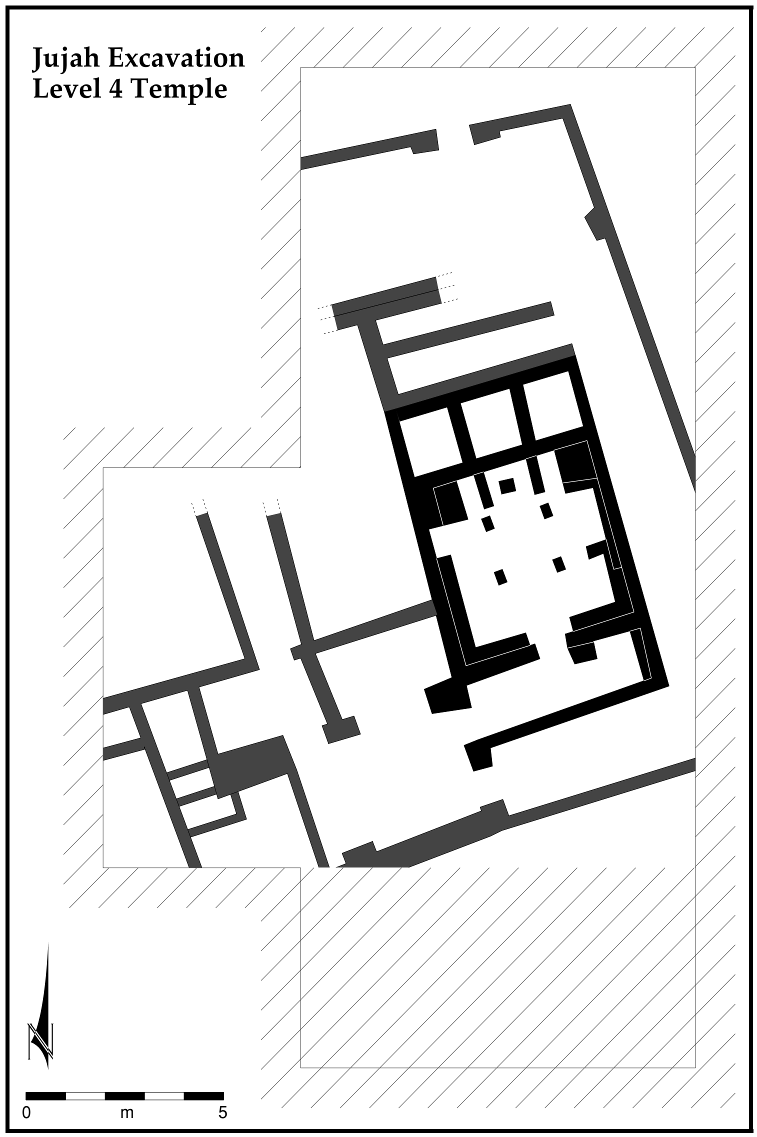

Figure 3.21: The Level 4 temple at S-24, as excavated in 1995.

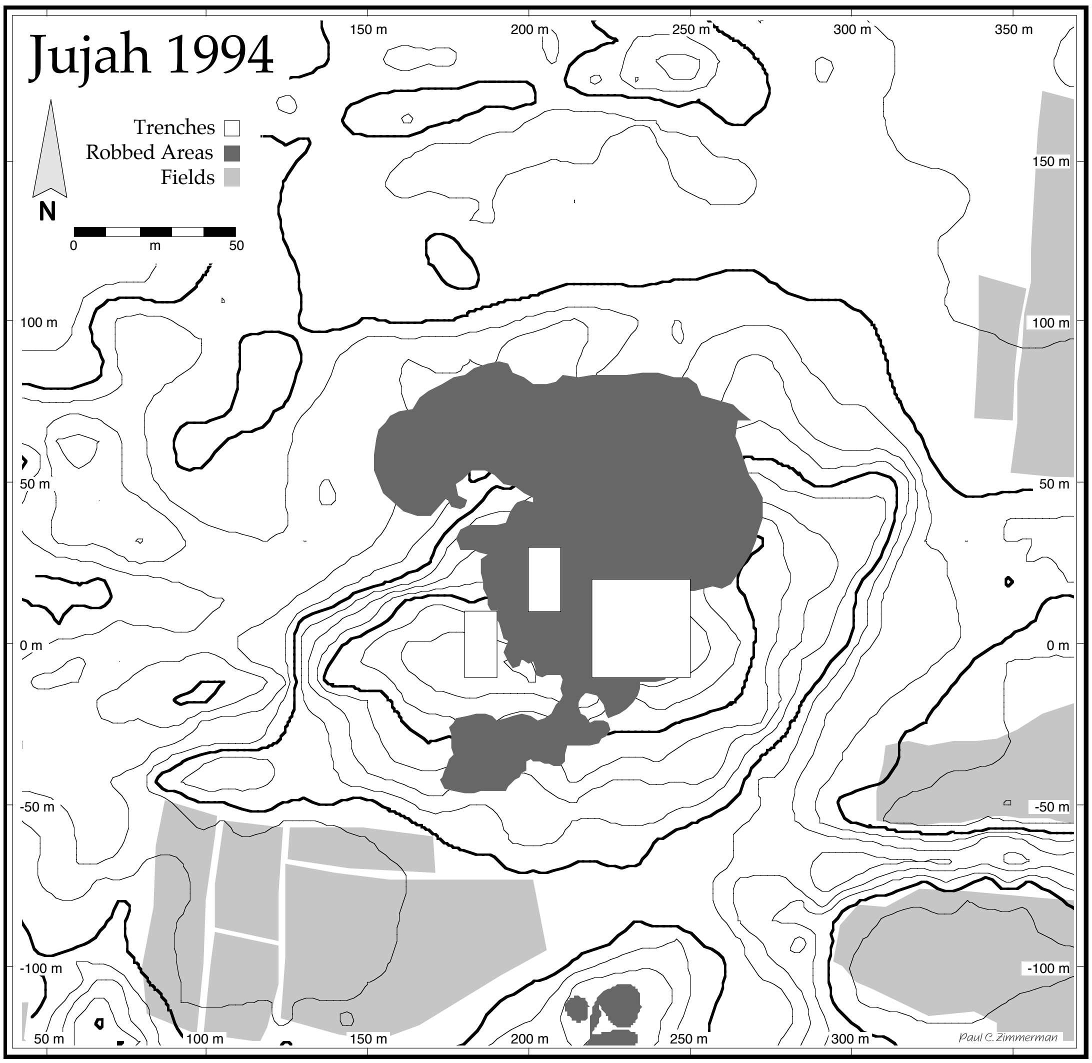

Figure 3.22: Overall contour plan from the 1994 excavations at S-24. Note the extent of the "robbed area."

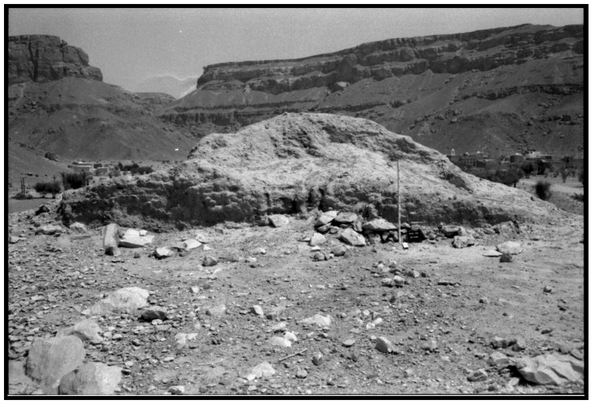

Figure 3.23: Structure at S-25, facing west.

foundation stones—of the southernmost mound.[7] The northernmost structure (A-28) has mud brick walls niched for a timber supportive lattice.[8] During the MHAS 1999 season, we re-visited this site to assess its preservation, and found that a large bulldozer cut had been taken out of the northeast end of A-28, and many of its foundation blocks had been removed and (as evidenced by partially finished column drums along the dirt road adjacent to the site) re-cut into cylinders for the local housing market (see Fig. 3.24).

S-27 جوجة ٤ (Jūjah 4)

GPS Coordinates: 1762449 N, 243036 E

This site appears as a small rise or low tell in the alluvium adjacent to the main Wādī Ḥaḍramūt trunk road. The site has been partially robbed for soils, leaving behind mud brick walls (see Fig. 3.25). No stone foundations are evident. Pieces of decorative limestone plaques (O-9, O-10, O-11), reminiscent of the monumental plaques from Raybūn, were found on the surface of the site and in the soil cut.

Figure 3.24: Structure A-28 at S-26, facing south.

Figure 3.25: Western end of S-27, facing north.

3.1.2 Sites from the MHAS 1999 Season

In 1999, site reconnaissance was conducted in the greater area of Wādī Ḥaḍramūt, between Qaṭn in the west and Tarīm in the east, including all major tributary wadis (see Fig. 3.26). Certain sites discovered in 1997 were re-visited in order to collect more data and to assess site preservation. An overview of the graffiti and rock art from this season was published independently by the project's GOAMM representative Ḥussayn al-ʿAydarūs in 2001.[9]

S-28 قلعة مريمة (Qalʿat Maryamah)

GPS Coordinates: 1766351 N, 268213 E

Islamic period castle atop a spur about 75 meters above the wadi floor (see Fig. 3.27). Two mud brick structures (A-1 and A-2) with stone foundations are on the spur's summit, and other, less substantial, structures are visible on its slopes. A-1 is possibly earlier than A-2, based their relative states of preservation.

S-29 مريمة (Maryamah)

GPS Coordinates: 1766333 N, 268380 E

Islamic village scattered along the foot of the jebel to the immediate east of, and overlooked by, S-28. At least fifteen structures, mud brick on stone foundations, including a mosque (which was not given an MHAS A- number). Some structures' walls stand over 4 meters tall (see Fig. 3.29). Ingrams lists towns governed by the Kathīrī sultan at Sayʾūn, including

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[7] I-28 reads 𐩣𐩧𐩦𐩵𐩣 (M R Š D M), and I-29 reads 𐩡𐩨[𐩱]𐩣 (L B [ʾ] M). Both are apparently personal or family names, probably graffiti that postdate the blocks on which they are pecked.

[8] This type of construction is highly distinctive, and best known from the palace at Šabwa (see Seigne, 1991). In the MHAS study area this treatment is also found in structures I, J, and K at Mašġah (Seigne, 1982) and A-11 at S-35. In all cases, these structures have typical Ḥaḍramī house plan of small storerooms flanking a central corridor with a staircase at the end opposite the door. But as opposed to the Level 1 houses at Jūjah, which are plain and unadorned, these are fitted with limestone and plaster plaques—which, in addition to the large amount of wood, suggest expensive constructions. Certainly, the examples at Šabwa, Mašġah, and S-35 all are prominent and presumably important structures. It can be presumed, then, that A-28 is also closely tied to the elites or administration of the kingdom of Ḥaḍramūt.

[9] al-ʿAydarūs, 2001.

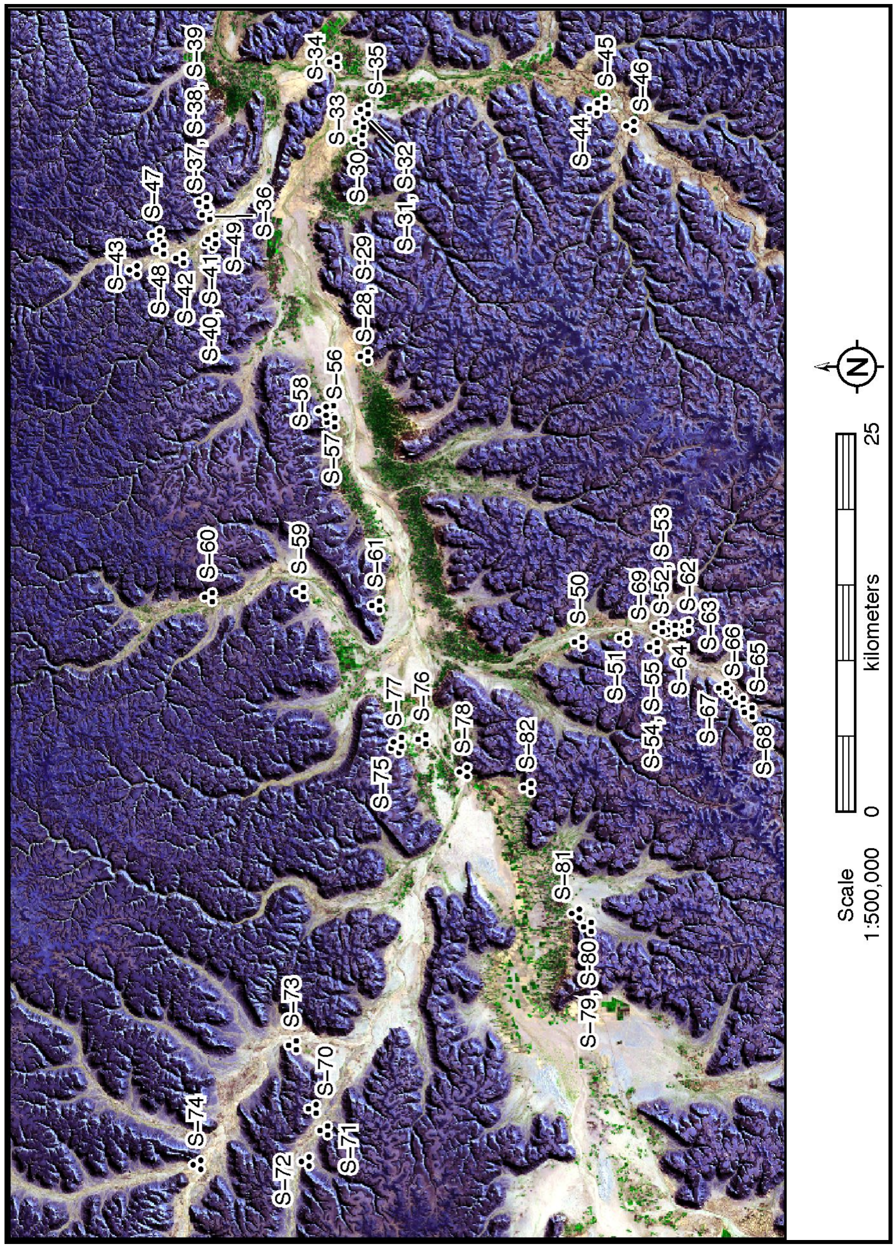

Figure 3.26: Sites visited in the 1999 MHAS field season.

Figure 3.27: S-28, as seen from S-29.

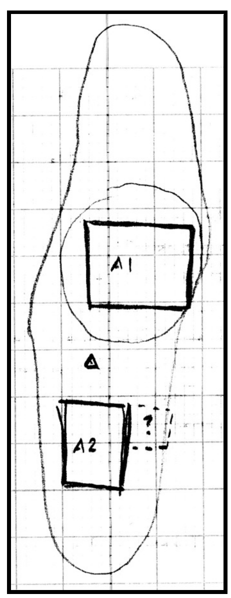

Figure 3.28: Sketch map of S-28, showing the locations of A-1 and A-2.

Figure 3.29: Overview of S-29, facing northeast.

among still-extant villages, one "Mariama."[10] This would imply that the ruins of S-29 were abandoned in the mid 20th century.

S-30 الصناهجة (aṣ-Ṣanāhajah)

GPS Coordinates: 1766717 N, 282566 E

Town site spread across a broad spur, about 55 meters above the wadi bottom, and the lower scree slope immediately to the south of the spur (see Figs. 3.30 and 3.31). Numerous mud brick structures with stone foundations, of which four were given MHAS ID numbers (A-3, A-4, A-5, and A-6). Approximately twenty houses, densely packed, one turreted fortress (A-4), and one mosque (A-6).

The residents of this town are all said to have moved to al-Andalūs in the Early Islamic Period, and its mosque's minbar is supposed to have borne a date of 1293 AD[11]—so some

[10] Ingrams, 1936, p. 540.

[11] Lewcock, 1986b, p. 34.

Figure 3.30: Mud brick structures at S-30, facing southeast, with A-4 in the foreground.

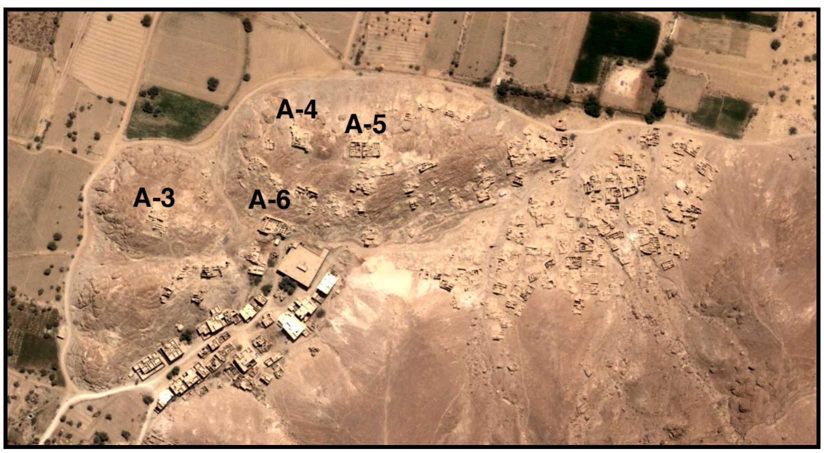

Figure 3.31: Google Earth image of S-30, with A-3, A-4, A-5, and A-6 indicated. (Note that this image has been rotated to fit the page; North, here, is to the left.)

historical evidence exists for an Early Islamic or Middle Islamic date of its main occupation. However, many of the walls of the structures here are in excellent condition, and the ceramics are mostly Late Islamic in date, leading me to believe that this site was abandoned much more recently. (There may, of course, be a secondary re-occupation of the site—in which case the town's original occupants may well have departed much earlier.) A modern village is nestled between the spur and the the wadi edge, but does not yet encroach upon the archaeological site.

Figure 3.32: Mouth of cave at S-31, facing southeast.

S-31 عادية الغرف ١ (ʿĀdīyyat al-Ġuraf 1)

GPS Coordinates: 1766292 N, 284240 E

A large shallow cave, currently fenced off and used as a sheep pen. The mouth of the cave is approximately 13 meters wide, and about 2 meters tall at its highest interior point (see Fig. 3.32). This was given an MHAS site ID number because of its proximity to other archaeological sites, and the expectation that there would be artifactual material here. However, no archaeological remains were found.

S-32 عاديه الغرف ٢ (ʿĀdīyyat al-Ġuraf 2)

GPS Coordinates: 1766543 N, 284331 E

A mud brick house, or cluster of structures (A-7), visible in section due to erosion and the excavation of soils for agriculture (see Fig. 3.33). In another cut, a short distance to the west of A-7, additional stone walls are also visible in section. A third mud brick structure (A-8), standing atop the alluvium somewhat further to the west, is bisected by a modern

Figure 3.33: Site S-32, facing east, showing robbed out area.

Figure 3.34: Structure A-8 at site S-32.

water channel (see Fig. 3.34). The functional and chronological relationship between these structures is unclear. Pre-Islamic inscriptions are said to have come from this site, but this could not be verified. This is probably the site referred to by Sedov and as-Saqqaf as the neighboring settlement belonging to al-Ġuraf (S-35) but "almost completely destroyed by modern houses, gardens, fields and irrigation works."[12]

S-33 GPS Coordinates: 1766655 N, 283634 E

A small mud brick fortress (A-9) atop a spur about 60 meters above the wadi floor, between S-30 and S-32 (see Fig. 3.35).

[12] Sedov and al Saqqaf, 1996, pp. 52–53.

Figure 3.35: Overview of S-33, facing northwest.

Figure 3.36: Overview of S-34, facing north.

S-34 GPS Coordinates: 1768389 N, 287677 E

A single kiln with great quantities of slag on the surface (see Fig. 3.36). Many porcelain sherds were found in the vicinity, including some which are probably modern. (Since the site is in an orchard, it is likely to have been frequently used as a picnic site after the cessation of its primary purpose.)

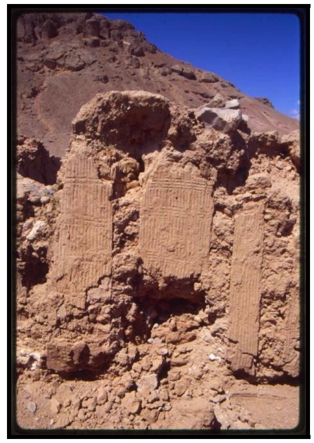

Figure 3.37: Detail of an interior wall of A-12 at S-35. Note the niching for the timber lattice, as well as the crosshatched decoration of the mud plaster.

S-35 الغرف (al-Ġuraf)

GPS Coordinates: 1766324 N, 284546 E

A small mound with a high peak and a lower lump, each holding the remains of a mud brick structure (A-11 and A-12, respectively). A-11 may belong to the Islamic period, whereas A-12, having walls niched for the characteristic Ḥaḍramī wooden lattice, as well as tripartite floor plan typical of such houses, is clearly Pre-Islamic (see Figs. 3.37 and 3.38). The top of A-11 is approximately 20 meters above the wadi floor. In the western face of the mound beneath A-11, a cut reveals a large, well-built, stone wall—probably the remains of a pre-existing building (see Fig. 3.39). A-12 was previously partially excavated, and the site is published by Sedov and as-Saqqaf. According to their article, the excavation here was carried out in 1981 by a Yemeni expedition, but all notes and records of the excavation were subsequently lost.[13] It also notes that a Soviet researcher was preparing a dissertation on this same site, but lost his notes while returning to Russia.[14]

[13] Sedov and al Saqqaf, 1996, p. 52.

[14] It should also be noted that the authors mistakenly state that this site is labeled “ruins of Qaret el-Senahiye” on von Wissmann’s map. On that map, however, this site is labeled “Quruf” (though, interestingly, it is not marked as ruins), and “Qaret el-Senahiye” indicates the site of aṣ-Ṣanāhajah (S-30).

Figure 3.38: Overview of structure A-12 at S-35.

Figure 3.39: Partially excavated stone wall in mound beneath A-11 at S-35, facing east.

Figure 3.40: Stone ring at S-36, facing southeast.

Figure 3.41: Detail of inscription I-1 at S-36.

S-36 GPS Coordinates: 1776799 N, 277566 E

A cluster of a few small stone rings and shelters amid large boulders (see Fig. 3.40). No clear indication of the age of these features is given, but one boulder carries an indecipherable Musnad inscription painted in red (I-1; see Fig. 3.41).

S-37 GPS Coordinates: 1776952 N, 278376 E

Two stone-built shelters under large stones, and 1 small stone ring on scree (see Fig. 3.42). No surface ceramics or lithics were found.

S-38 GPS Coordinates: 1776978 N, 278370 E

Two very small stone circles. Rings of the western one have broad rocks laid flat inside. Many agates and other decorative stones atop and around these rings (see Fig. 3.43). Clearly

Figure 3.42: Stone ring at S-37, facing south.

Figure 3.43: Stone rings at S-38, facing south.

anthropogenic, but of unknown function or age, and without any associated artifacts.

S-39 GPS Coordinates: 1777026 N, 278418 E

End of a footpath leading up to the jōl. Supposedly, this path takes one 2–3 days to Ṯamūd. Marked by piles of stones, and a stone circle at its southern end (see Fig. 3.44). Appears to be in occasional use—and as there is no outward indication of its age, it may not, in fact, be ancient.

Figure 3.44: End of foot path at S-39, facing northeast.

S-40 القطار ١ (al-Qaṭṭār 1)

GPS Coordinates: 1776629 N, 275909 E

Graffiti covered boulder with pecked Himyarite-style characters (see Fig. 3.45). Numerous inscriptions are on this stone, of which eleven (I-2 through I-12) were recorded. About 30 meters to the southeast of the boulder stands a stone circle, measuring about 10 meters in diameter.

Inscription I-3 deserves special note here, as it is the longest inscription of the entire MHAS corpus. Whereas most of the texts found are simply graffiti of only a few characters—probably personal names—I-3 appears to be a short document. Palaeographically and in execution, it is similar to some of the Ḥaḍramī royal inscriptions from al-ʿUqla. Though I was unable to translate this text, the serifs on the letters and the presence of the god's name RḤMNN both point to a 5th century AD date (see Fig. 3.46).[15] The other inscriptions on this stone are executed in a similar manner, suggesting that they are all from roughly the same time period (see Figs. 3.47, 3.48, 3.49, and 3.50 for the most interesting examples).

[15] See Ryckmans, 1987, p. 110 for the ascendency of Raḥmanānism, an autochthonous monotheist religion, in the late Pre-Islamic period.

Figure 3.45: Overview of graffiti-covered boulder at S-40, facing southwest.

Transcription		*Transliteration*
𐩹𐩧𐩴𐩢 𐩣	*1*	Y R D Ḥ M
𐩧𐩢𐩣𐩬𐩬	*2*	R Ḥ M N N
𐩸𐩨𐩪𐩣𐩹𐩬𐩱𐩡𐩹	*3*	Ḏ B S M Y N ʿ L Y
𐩰𐩪𐩴𐩣 𐩸𐩠	*4*	ʾ S D M Ḏ H
[𐩥]𐩡𐩸𐩡	*5*	[W] L Ḏ L
𐩠𐩣𐩩𐩱	*6*	H M T ʿ

Figure 3.46: Inscription I-3 from S-40.

Transcription		*Transliteration*
𐩺𐩥𐩣	*1*	Y W M
𐩮𐩡𐩡	*2*	Ṣ L L

Figure 3.47: Inscription I-2 from S-40. The top lines of I-3 are visible in the lower left of the frame.

Transcription		*Transliteration*
𐩲𐩣𐩧𐩣	*1*	ʿ M R M

Figure 3.48: Inscription I-5 from S-40. This is probably a personal name.

Transcription		*Transliteration*
⪡ᛚᛉⱧ	*1*	Ḏ H L M
⪡ᛋᚱ	*2*	ʾ N M
[ᛘ] [ᛘ] [⪡] [ᛚ]	*3*	[L] [M] [Y] [Y]

Figure 3.49: Inscription I-6 from S-40. The first two lines are proper names, but the third line, consisting of letters stacked vertically, is a monogram and difficult to disentangle.

Transcription		*Transliteration*
ǀ∏∏Ψ	*1*	Ḥ B B
∏ǀ∏)	*2*	R B B
ᛋᛘΨ)	*3*	R Ḥ Y N

Figure 3.50: Inscription I-7 from S-40. The execution of these characters is unusual, making the entire text difficult to decipher. In particular, what I have transcribed as ∏ may actually be Ⱨ.

Figure 3.51: Overview of S-41, facing southeast.

Figure 3.52: Overall view of the northwest face of S-41. Inscription I-15 is visible in the upper right of the frame, with the painted camel rider is just above and to its left.

S-41 القطار ٢ (al-Qaṭṭār 2)

GPS Coordinates: 1776625 N, 275649 E

Graffiti-covered boulder with pecked Musnad inscriptions (I-13, I-14, I-15) on its north face (see Fig. 3.51). Red and yellow painted animals, humans, and abstract designs are also found on its north and south faces. The human figures carry staffs, and one is mounted on what appears to be a camel (see Fig. 3.52). Because the inscriptions are pecked through the painted figures, they clearly post-date those figures.

The inscriptions on S-41 are simple names, written vertically, with some characters rotated

Figure 3.53: Top of ridge upon which most of S-42 is located, facing southeast.

and interlocking as if they were monograms. I-13 reads 𐩬𐩣𐩯𐩦 (Š M S N), which may be a the deity's name or a tribal name.[16] I-14 reads 𐩱 [𐩹] 𐩧 (R [Ḏ] ʾ)—which, though the second letter is unclear, is probably also a personal or tribal name. The two inscriptions making up I-15, however, are illegible.[17] Also written vertically, though, they are probably also similar in time and meaning to I-13 and I-14.

S-42 اليوية (al-Yuwayyah)

GPS Coordinates: 1778552 N, 274684 E

Cairns, lines, and stone circles stretched along a ridge line and on the slopes below (see Fig. 3.53). The largest cairn stands over 1 meter high, and is clearly visible from the wadi below. Very few surface collections were made (only two possible lithic artifacts), but trodden surfaces and footpaths cover the site. The top of the ridge is about 100 meters above the wadi bottom, and stone rings are visible on the wadi floor at the foot of the slope to the east. A spring flows from the cliff face below and to the west of the site, and a check dam blocks the ravine below the spring.

[16] Beeston, 1962, pp. 41–42, pl. X.

[17] Note that Plate 16b (I-15) is printed sideways in al-ʿAydarūs, 2001.

Figure 3.54: Stone foundations at southern end of S-43, facing south.

S-43 عقلة الخملول (ʿUqlat al-Ḫamlūl)

GPS Coordinates: 1781599 N, 273897 E

Lookout (A-13) on a spur at the confluence of Wādī Ḫamlūl to the west and Wādī Ḏahab to the east. A-13 is an Islamic period mud brick structure with stone foundations, and sits about 35 meters above the wadi floor (see Fig. 3.54).

S-44 GPS Coordinates: 1751235 N, 284587 E

Stone line on the north slope of a western tributary of Wādī ʿIdm (see Fig. 3.55). Unlike most alignments found in the MHAS study area, there is no cairn at the top of this alignment. Instead, a footpath continues upwards, but can only be followed about 30 meters. Below the line, on the wadi bed, the stone foundations of a small square structure (A-14) were found. Whereas the orientation and construction of the alignment at this site are comparable to others in the region, most of which are assumed to be funerary monuments, the function of S-44 is unknown.

S-45 GPS Coordinates: 1750693 N, 284969 E

Large stone and mortar sluices and other irrigation installations standing in the alluvium and plainly visible above its surface. The largest structures stand up to 3 meters above the present surface (see Fig. 3.56). Besides those mapped at the given GPS coordinates, other similar structures are visible in the vicinity, especially to the west. One particularly large

Figure 3.55: Overview of S-44 from slope, facing south. Stone alignment is in the foreground.

Figure 3.56: Stone and mud brick irrigation installations at S-45, facing southeast.

and well-preserved cistern or holding tank was found about 250 meters to the southwest, at the bottom of the slope. It is assumed that these structures comprised part of a single ancient water management system, probably belonging to the nearby Pre-Islamic cities of Sūnah and Mašġah.[18]

[18] Since the sites of Sūnah and Mašġah were known prior to the commencement of this project, and since the 1999 season was intended to be followed by another season of more intensive survey, we did not, at that time visit either of these sites, despite our proximity to them. Thus, they were not visited or given MHAS site ID numbers, and no collections were made there, despite our initial intention to do so.

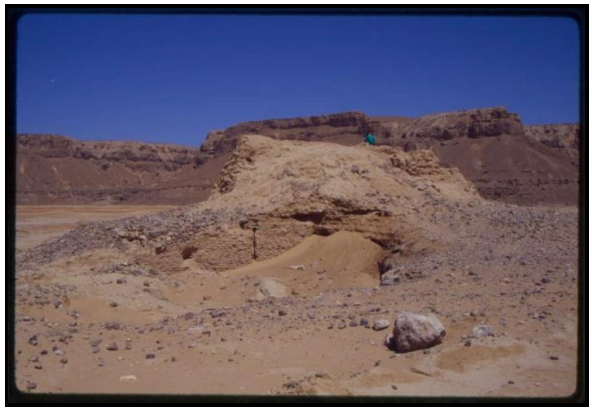

Figure 3.57: Overview of A-15 at S-46, facing northwest, showing partially-revealed mud brick walls of earlier structure.

S-46 حكمة (Ḥakmah)

GPS Coordinates: 1748796 N, 283446 E

A Single house (A-15) in the middle of the wadi, on a gravel bed in the alluvium (see Fig. 3.57). It is probably Islamic, but soil excavation at its southeast corner reveals an earlier mud brick wall (see Fig. 3.58). This suggests that A-15 is founded on the site of an earlier structure (as is clearly seen at S-35). There is a large quantity of obsidian flakes in and around the structure—far more of this material than was seen at any other site in the region.[19] It is likely, given its location, that it is an outlying structure of Sūnah.

S-47 وادي شب ١ (Wādī Šab 1)

GPS Coordinates: 1780083 N, 276191 E

Painted designs of interlocking rings on the northeast face of an upright boulder (see Fig. 3.59). Yellow and red paints used—together, in the case of the largest example. Some cairns, stone circles, and shelters are also found in the vicinity, but weren't specifically

[19] Caton-Thompson and Gardner also noted the particularly high concentration of obsidian microliths found in and around the nearby site of Sūnah (Caton-Thompson and Gardner, 1939, p. 31).

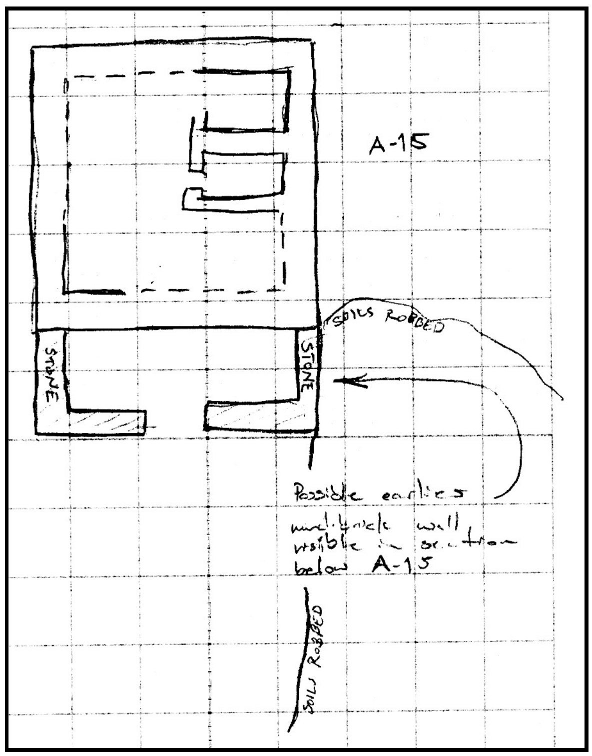

Figure 3.58: Sketch map of structure A-15 at S-46.

Figure 3.59: Upright boulder at S-47, facing west.

recorded.

S-48 وادي شب ٢ (Wādī Šab 2)

GPS Coordinates: 1779843 N, 275279 E

Square lookout (A-16) on a ridge about 75 meters above the wadi floor, and with a commanding view of Wādī Šab, and much of Wādī Ḏahab. Stone foundations partially encased in mud, presumably decay from the brick superstructure. One small stone pile, perhaps a cairn, is found about 5 meters to the west of the structure, and stone circles are found around 20–30 meters west and northwest (see Fig. 3.60).

S-49 GPS Coordinates: 1776399 N, 275954 E

Two cairns on the scree slope. The upper cairn, set on a bedrock outcrop about 70 meters above the wadi floor, appears younger because its stones are less heavily patinated than are those of the lower cairn (see Fig. 3.61).

Figure 3.60: Overview of S-48, facing southeast, showing a stone circle in the foreground and A-16 in the background.

Figure 3.61: Uppermost cairn at S-49, facing northward down the slope.

Figure 3.62: Northeast corner of A-17 at S-50, facing northeast.

S-50 حصن با هزيل (Ḥiṣn Bā Hazayl)

GPS Coordinates: 1752203 N, 249317 E

Castle (A-17) on a spur about 45 meters above the wadi floor. The structure has mud brick walls on tall, well-built, stone foundations (see Fig. 3.62). A second mud brick structure (A-18), similar in size but less imposing and probably of more recent date, is to the west on the same spur.

S-51 GPS Coordinates: 1749235 N, 249594 E

Seven to ten buildings, mud brick with stone foundations (see Fig. 3.63). Most of the structures here are eroded to their foundations, but two or three have substantial superstructures, suggesting that this is a two period site, without temporal continuity. The especially poor state of preservation of some of the foundations also leads me to believe that those structures, after their abandonment, were quarried for their foundation stones. As of early 2008, satellite imagery reveals that two new buildings have been erected on this site since it was visited in 1999. Though the images are not clear enough to be certain, it appears that the mud brick building seen in Figure 3.63 has been obliterated.

S-52 GPS Coordinates: 1746657 N, 250190 E

Three cairns and an alignment extending as high as 140 meters above the wadi floor, on the scree above the first ledge (see Fig. 3.64).

Figure 3.63: Overview of S-51, facing southwest.

Figure 3.64: Cairn and line on slope at S-52, facing northwest.

Figure 3.65: Stone rings at eastern edge of S-53, facing south.

S-53 GPS Coordinates: 1746551 N, 250143 E

At least a dozen stone circles, all evidently very old, on the first ledge (about 70 meters above the wadi floor; see Fig. 3.65). Each stone circle is 4–8 meters in diameter, with trodden or deflated surfaces between and within them. This site appears very similar to the one described by McCorriston, Šiʿb Munaydar, which is at the same latitude in Wādī ʿIdm (the next major wadi to the east of Wādī Bin ʿAlī).[20] In addition to the stone circles, there are also the foundations of a small rectangular lookout (A-19) at the edge of the terrace. This structure, though ancient, appears to well postdate the other features at this site (see Fig. 3.66).

S-54 الظاهرة (aẓ-Ẓāharah)

GPS Coordinates: 1747249 N, 249002 E

Stone ring approximately 14 meters by 11 meters, intersecting the stone foundations of a rectangular structure (A-20) at its eastern corner (see Fig. 3.67). Both of these structures are

[20] McCorriston, 2000.

Figure 3.66: Structure A-19 at S-53. Note the cobble foundation covered in small stones, which is reminiscent of A-23.

Figure 3.67: Stone ring at S-54, facing west.

constructed of large upright stones and piled smaller stones, and appear contemporaneous. The area around and inside the stone ring is blackened and clearly visible from S-53 as a dark stain. The size of the stone ring and the discoloration of its surface soils suggest that this may have been an animal pen.

S-55 GPS Coordinates: 1747255 N, 248925 E

Small Islamic period village of five mud brick houses with stone foundations. There is also one cairn and one stone ring that be more properly considered part of S-54 (which is only 100 meters away). Most of the mud brick superstructures of the smallest buildings

Figure 3.68: Structure A-21 at S-55, facing west.

have eroded away. The largest house (A-21) has large, hewn, stone foundation blocks that suggest the reuse of a Pre-Islamic stucture, possibly a platform temple (see Fig. 3.68),[21] and the foundations of one of the smaller structures is composed of upright stones, suggestive of Neolithic/Bronze Age construction, with later reuse.

S-56 قلعة الحبوظي (Qalʿat al-Ḥabūẓī)

GPS Coordinates: 1768629 N, 264635 E

Large structure (A-22) occupying the entire top of a spur, about 50 meters above the wadi floor. Some sections of the mud brick walls of this building sit atop stone foundations, and others are founded directly on the underlying bedrock. A-22 has a square ground plan, aligned to the cardinal points, and its northeast and northwest corners are buttressed or fitted with small turrets. Some stone walls from other structures are also visible in the eastern slope of the spur and on the wadi floor to the east (see Fig. 3.69).

[21] The Pre-Islamic occupation of this site, and the presumption that A-21 is built atop Pre-Islamic foundations, are supported by the Musnad inscription on sherd C-60 (see Subsection 4.2.34, below).

Figure 3.69: View of S-56 from below, facing southwest.

Figure 3.70: Overview of S-57, facing southeast.

S-57 المطيول (al-Muṭaywal)

GPS Coordinates: 1768559 N, 263823 E

Stone ring, 17 meters by 14 meters, made of large stones set upright on end (see Fig. 3.70). Some stones are toppled, and some have been broken away, apparently recently. The site is located on a level spot in the scree about 10 meters above the wadi floor. The easternmost (and largest) stone of the ring has a Musnad inscription (I-16), badly weathered and illegible.

S-58 GPS Coordinates: 1769121 N, 264586 E

Cairn site spread on ridge about 100 meters above the wadi floor. Ten or more cairns, the

Figure 3.71: Largest cairn at S-58, facing southeast.

Figure 3.72: Cairn at S-59, facing north.

largest of which stands about a meter high (see Fig. 3.71). A line of stone piles extends NW–SE for 80 meters, defining the western edge of the site.

S-59 GPS Coordinates: 1770615 N, 252629 E

Small stone ring composed of large blocks set upright on end (see Fig. 3.72). The southernmost block has been recently removed and broken up, as is evidenced by debris from its destruction. The ring is hidden from view behind a large standing boulder, around which are clustered stone built shelters, apparently relatively recent. Numerous cairns are also seen on the slopes to the east and southeast, but were not closely examined.

Figure 3.73: Structure A-24 at S-60, facing north.

Figure 3.74: Westernmost structure at S-61, facing northwest.

S-60 GPS Coordinates: 1776642 N, 252281 E

Small stone structure (A-24) atop a spur about 45 meters above the wadi floor (see Fig. 3.73).

S-61 GPS Coordinates: 1765577 N, 251738 E

Large lookout or house complex of three adjacent buildings on a spur overlooking the village of Bhayr. Mud brick walls on stone foundations throughout (see Fig. 3.74). One wall stands over 6 meters high, but is badly undercut, and in danger of collapsing.

S-62 GPS Coordinates: 1745444 N, 250297 E

Large stone on the wadi bed with four pecked Musnad inscriptions (I-30, I-31, I-32, I-33).

Figure 3.75: S-63, facing southwest.

Fragmentary and crudely executed, these are nevertheless probably personal names.

S-63 قبر النبي شعيب (Qabr an-Nabī Šuʿayb)

GPS Coordinates: 1745166 N, 250367 E

A single large grave, the burial site of a Ḥaḍramī saint, built of carefully piled stones. About 4.5 meters long, and aligned north–south (see Fig. 3.75). There is also a fire pit to the northeast of the grave, but their interrelation is uncertain.

S-64 GPS Coordinates: 1746062 N, 250127 E

An abandoned Islamic village clustered around a large boulder, atop which sits a lookout (A-25; see Figs. 3.76 and 3.77). A small Musnad inscription (I-34) is scratched into that stone, but is presumed to predate the rest of the site. The village is comprised of about 30 tightly clustered mud brick houses. At the southern edge of the the village stands a large rectangular building or open-air enclosure (A-26), the function of which is unknown. A-26 is of mud brick on stone foundations, and in places its walls stand to 2.5 meters high. An off-axis doorway in the structure's western wall provides access to the western room (perhaps a courtyard). An interior N–S wall, with a door at its southern end, separates this outer chamber from an inner room. The interior walls of this eastern room are equipped with decorative buttresses.

Figure 3.76: Google Earth image of site S-64. A-25 is in the middle of the site, and A-26 is visible at its southern end. The large structure to the west of the site was noted but not given an MHAS architecture ID.

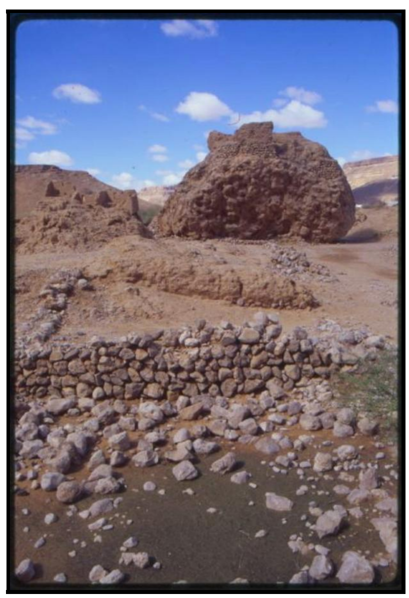

Figure 3.77: Facing west toward stone walls in the center of village S-64, with A-25 atop the boulder in the background.

Figure 3.78: Structure A-27 at S-65, facing south.

S-65 وادي برم ١ (Wādī Bram 1)

GPS Coordinates: 1741579 N, 245307 E

An expansive site on the first ledge, about 35 meters above the wadi floor, with over a dozen stone rings of various sizes and a number of cairns. The most visible cairn on the site, perched on its northeast edge, is enclosed by a low rectilinear stone wall with traces of mud brick (A-27; see Fig. 3.78). Some of the stone rings are quite substantial—built of stones standing on end, and, in one case, piled with other stones to 1 meter in height. There is also a high quantity of lithic tools and debris visible on the surface of the site—including, most impressively, large bifacial points. Five of these were collected in 1999, and in 2000 the site was re-visited by Ḥussayn al-ʿAydarūs, who collected a sixth example. It is probable that the various artifacts and structures at this site represent multiple occupations or reuse separated by millennia.[22]

S-66 GPS Coordinates: 1742421 N, 245963 E

A boulder on the wadi bed with pecked animal figures (probably ibexes) on its northeast face. A single letter 𐩩 is also scratched into the stone, but it appears to be more recent than the figures. Beneath the boulder, and around other stones in the area, are stone-built shelters

[22] See 5.5, below, for a discussion of these points. S-65 was recently visited by Rémy Crassard, who notes the difficulty in dating this site and its objects (Crassard, 2007, pp. 306–307).

Figure 3.79: Northern end of “bench wall” cairn at S-67, facing south.

of indeterminable age.

S-67 GPS Coordinates: 1742702 N, 246258 E

Cairn site on the first ledge, about 55 meters above the wadi floor, but also extending a short distance up the slope the west. The most visible structure on the site is built like a low rectangular bench wall of upright stones, approximately 15 meters long (see Fig. 3.79). In somewhat poor condition, the survey team could not agree on whether it was a single mass or five smaller cairns enclosed by a common wall. Other similar sites are on the ledge to the north, and on the second ledge overlooking this site. Below the site, stone rings are visible on the wadi floor, with stone alignments directed toward the site. About 400 meters south of the site, on the wadi floor, stands a large boulder around which numerous stone rings are clustered. On that stone is a single Musnad inscription (I-35), probably a personal name, and some faintly pecked animal and human figures.

Figure 3.80: Cairn and “spoked” ring at S-68, facing south.

S-68 وادي برم ٢ (Wādī Bram 2)

GPS Coordinates: 1740994 N, 244661 E

Expansive site on the first ledge similar to, and in plain view of S-65. Numerous cairns and stone circles. Cairns are clustered along the cliff edge, and stone rings (bearing some similarity to those from S-53) are at the base of the slope and extend up it some distance. Stone rings and cairns, in worse condition, are also found on the wadi bed below the site. Many lithic tools, including some that appear very similar to the bifacial industry discovered at S-65 are found here. One broken, but otherwise excellent, Neolithic point (O-114) was found in one of the stone rings. The largest stone rings (of which there are at least five) appear to be house foundations. Many of these rings have smaller rings attached to their northwest exteriors and/or to their southeast interiors. One rectangular stone structure is also on the site, amongst the stone rings. The largest cairn on the site is surrouded by a ring wall with arms projecting radially inward to the cairn, like the spokes of a wheel (see Fig. 3.80).

S-69 GPS Coordinates: 1746934 N, 250311 E

Stone with many pecked animal and human figures on its northeast face (see Fig. 3.81). Animals include long horned caprids, probably ibexes. Some of the humans are depicted as riders, but whether their mounts are horses or camels cannot be determined.

Figure 3.81: Overview of S-69, facing southeast.

Figure 3.82: Bottom part of the stone line at S-70, facing south.

S-70 GPS Coordinates: 1769786 N, 218445 E

A low meandering line that runs for over 150 meters down the slope, over a rock outcrop, and across the wadi floor (see Fig. 3.82). The top of line reaches about 90 meters above wadi floor, and its southern (i.e., downhill) end terminates in a stone cist made of large slabs. The interior of this cist is open, and may have been looted in the recent past. Other features on the wadi bottom near the line include a stone ring, a small cairn with upright stones, and some possible larger cairns.

S-71 GPS Coordinates: 1768989 N, 217021 E

Large stone with pecked depictions of hands and ibexes on its northwest, southwest, and

Figure 3.83: Detail of an ibex figure pecked into the boulder at S-71. Note the elongated body and exaggerated horns.

southeast faces (see Fig. 3.83).

S-72 قبر النبي صالح (Qabr an-Nabī Ṣāliḥ)

GPS Coordinates: 1770234 N, 214971 E

Long tomb, about 25 meters north–south, inside of an enclosure (see Fig. 3.84). Though the roof of the enclosure has long since collapsed, the site is obviously still used and maintained as a shrine.[23] The tomb's northern orthostat has a Musnad inscription (I-36). Because of the ongoing use of this site, I would hesitate to call it an "archaeological" site (rather than a cultural or religious monument), if it were not for the inscription. In the vicinity there are a number of unusual buildings that I suspect may indicate the reuse of Pre-Islamic structures.

The inscription, I-36, is dismissed by Rodionov as appearing "brand new" in 1990,[24] and is misidentified as Himyarite by Ingrams.[25] Though the stone's whitewash has partially obscured the inscription, enough remains to identify it as a Ḥaḍramī inscription, and at least one word (M Q T W = "officer") is legible (see Fig. 3.85). The absence of serifs on

[23] H. W. Ingrams' photograph of the tomb (Ingrams, 1936, top, facing p. 533) shows that the site changed very little between 1934 and 1999.

[24] Rodionov, 2001, p. 263.

[25] Ingrams, 1936, p. 535.

Figure 3.84: Tomb at S-72, facing north.

the letters shows that this inscription is pre-Himyarite, probably dating to the middle 1st millennium BC. Because the inscription runs vertically, and because the rounded top edge appears broken, it is likely that this particular block is reused from another context where it was originally mounted horizontally.

S-73 المركزات (al-Markazāt)

GPS Coordinates: 1771090 N, 222650 E

Dolmen site on a gravel bed on the alluvium (see Figs. 3.86 and 3.87). Three dolmen-like structures made of very large flat stones, One typical stone ring, and one small diameter stone ring made of large upright stones. The southernmost dolmen is circular, about 6 meters in diameter. The second dolmen is rectangular, 5 meters by 2 meters, and the third dolmen is about 2 meters square. The round dolmen is enclosed by a circular curb, and the rectangular and square dolmens are enclosed together by a single rectangular curb. The square and rectangular dolmens each have carved decoration of undulating lines on the inner

Transcription		*Transliteration*
𐩨𐩫𐩿𐩷𐩡[...]	*1*	BK ṬL[...]
[...]𐩣𐩤𐩩𐩥𐩿𐩪[𐩨]	*2*	[...]MQTW S[B]

Figure 3.85: Inscription I-36 from site S-72.

Figure 3.86: Dolmen-like structures at S-73, facing northwest.

surfaces of their upright blocks. Also, a hand is pecked into the northwest face of a large stone at the northeast end of the site. The Smithsonian expedition visited this site in the 1960s, briefly describing it and with a discussion of the undulating line pattern.[26] Also, following my survey's exploration of S-73, the French HDOR survey also visited the site, and have published the most complete description of the dolmens found there (though in the context of a general discussion of dolmen-like structures in Southwestern Arabia).[27]

S-74 GPS Coordinates: 1777405 N, 214767 E

Large stone at the base of the slope, covered with a palimpsest of Musnad inscriptions, mostly on its southwest face (see Figs. 3.88 and 3.89).[28] Too many inscriptions to untangle and record individually, so the inscriptions on the southwest face are listed as a group (I-37). Three more inscriptions, on the stone's eastern face, were assigned I-38, I-39, and I-40. A low stone wall shores up the southern side of the stone—which appears, by the varying

[26] Van Beek *et al.*, 1963, pp. 535–537.

[27] Braemer, Cleuziou, and Steimer, 2003, pp. 171–174. Note that Braemer *et al.* call the circular dolmen (which I refer to as "Dolmen 1," above) "Structure 2." They also argue that what I refer to as "Dolmen 2" and "Dolmen 3" (and which they call "Structure 1") is really a single rectangular dolmen, rather than two smaller structures within a single enclosure. Their interpretation of this structure is entirely reasonable, but bears another examination for confirmation. Also of interest, they note that a third stone ring, in the north of the site, has been destroyed some time since 1992. I found no evidence of this, but would like to reinvestigate.

[28] The Bents, when they visited this site, read MSBM, which they interpreted as "caravan road" (Bent, 1900, p. 129). I, however, did not find any candidates for this reading.

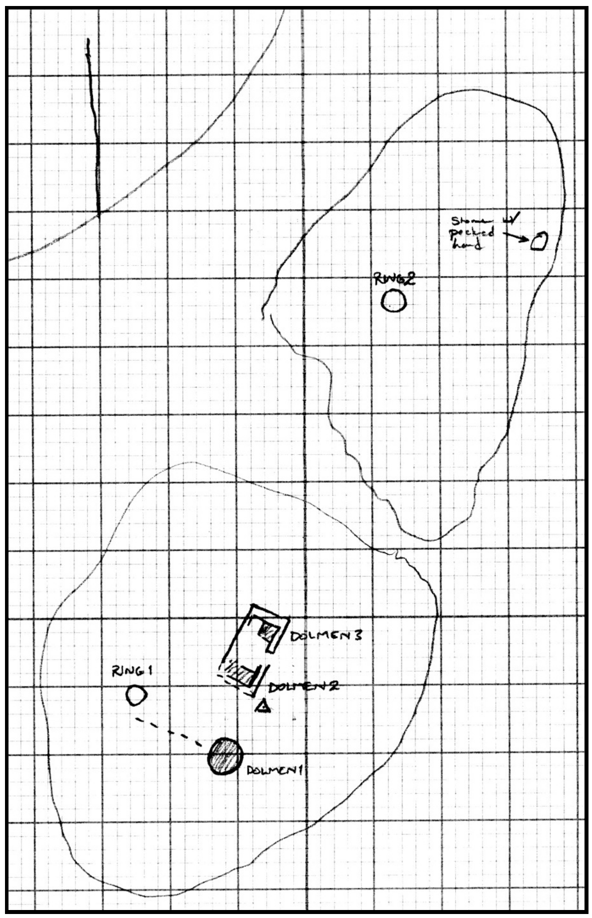

Figure 3.87: Sketch map of S-73, showing the locations of the dolmens.

Figure 3.88: Inscribed boulder at S-74, facing northeast.

orientations of its inscriptions, to have rolled in antiquity between its earliest and latest such markings. Possible cairns lie across the road about 40 meters south of the stone. A stone line runs up the slope, starting about 10 meters northeast of the stone. Also, a stone ring, half washed away, stands on the wadi bottom about 80 meters east of the stone.

S-75 GPS Coordinates: 1764299 N, 242286 E

Stone with pecked Musnad inscriptions, scratched animal and human figures and hands, and red painted Arabic inscriptions. This boulder is more heavily inscribed than any other such stone in the area (see Figs. 3.90, 3.91, and 3.92). Most inscriptions are on its east face, but the north and west faces also have inscriptions. As with site S-74, there are too many inscriptions here to disentangle and record each individually in the brief time available, so no MHAS ID numbers were given. Other large stones in the area also have some inscriptions on them (one or two per stone is typical).[29]

[29] We came to this site to investigate a report of this stone's destruction for building materials. Fortunately, it was found intact—but a short distance to the east, much recent stone cutting has been undertaken since we visited the area in 1997. This stone, though as yet untouched, is in some peril of meeting a similar fate.

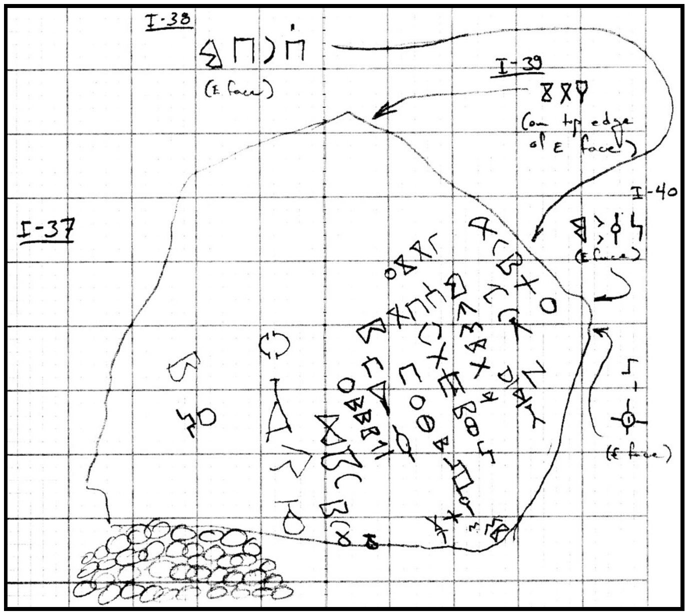

Figure 3.89: Drawing of the inscriptions on the boulder at S-74.

Figure 3.90: Boulder at S-75, facing west.

Figure 3.91: Inscriptions and rock art on east face of boulder at S-75.

Figure 3.92: Inscriptions and rock art on north face of boulder at S-75. Note the numerous ibexes depicted, apparently as part of the same composition as certain inscriptions.

Figure 3.93: Structure A-29 at S-77, facing west.

S-76 GPS Coordinates: 1762522 N, 242873 E

A fortress at the intersection between the main Wādī Ḥaḍramūt trunk road and the side road to Jūjah. This site was used as a surveying control point for the NYU Jūjah excavations in 1994.[30] Between 1995 and 1997, however, this site was bulldozed, and now only a low rise remains.

S-77 GPS Coordinates: 1764155 N, 242718 E

A large Islamic period house on the wadi bed (A-29; see Fig. 3.93). Numerous other structures are also visible in the area, though many are obscured and partially destroyed by modern lime kilns. Contemporaneity of the various structures was not established.

S-78 أُم العرض (Umm al-ʿArḍ)

GPS Coordinates: 1759808 N, 240744 E

A Pre-Islamic settlement with possible earlier and later elements. the most prominent feature of the site is a very large boulder, precariously perched (see Fig. 3.94). The underside

[30] Hansen, 1994, p. 10.

Figure 3.94: Overview of S-78, facing northeast. The wall in the middle right-hand side of the frame is the foundation of A-30

of the boulder is covered in red-painted designs and figures, and around its base a substantial shelter is built of piled stones (see Fig. 3.95). The shelter partially obscures the paintings, and is, therefore, later than them. The remains of a structure, now inaccessible, are also visible atop the boulder. To the west of the boulder, on the scree, is the stone foundation of a Pre-Islamic house (A-30). Short sections of walls are also visible in the slope behind A-30, and two caves are visible in the slope at the eastern edge of the site. The larger cave is about 6 meters in diameter, over 3 meters tall at its highest interior point, and with a ledge about 1.5 meters above the current floor running across its back walls. Judging by its similarity to the caves excavated by Caton-Thompson,[31] this cave is almost certainly a Pre-Islamic tomb. There has been some encroachment upon the site by fields and modern houses, particularly upon structure A-30.

S-79 GPS Coordinates: 1751623 N, 230497 E

One cairn and one small box built of stones set upright, on the scree slope, about 30 meters above the wadi floor (see Fig. 3.96).

S-80 GPS Coordinates: 1751516 N, 230442 E

One large cairn, on the scree about 50 meters above the wadi floor, with small piles of stones

[31] Caton-Thompson, 1944.

Figure 3.95: Underside of north face of boulder at S-78. Note the dry laid cobble wall, of indeterminate age, built against the boulder. Also note the detailed but very stylized painted ibex in the upper left corner of the frame. The animal's beard and the ridges on its horns are clearly visible.

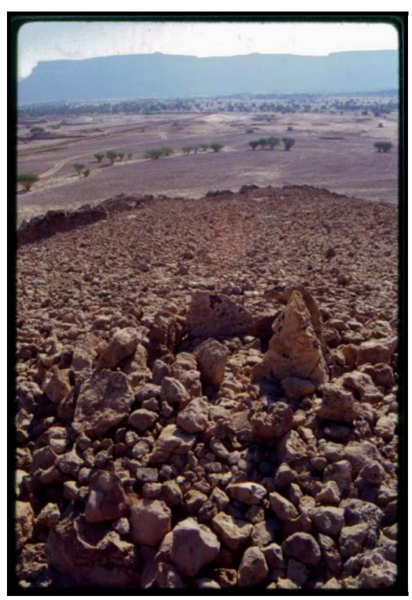

Figure 3.96: Stone square at S-79, facing east.

Figure 3.97: Large cairn at S-80, facing east.

Figure 3.98: View of boulder at S-81, facing northeast.

arranged in a line down the slope below it. The large cairn stands over 1 meter high, is built on a rock outcrop, and appears to be undisturbed (see Fig. 3.97).

S-81 GPS Coordinates: 1752403 N, 231353 E

Large stone with pecked Musnad inscriptions (I-41, I-42, I-43, I-44) on its southwest face (see Fig. 3.98). Of these inscriptions, I-41 is notable for its enclosure box which resembles a boat (see Fig. 3.99).

Figure 3.99: Detail of I-41 (top) and I-42 bottom at S-81. Note the elaborated bounding box around I-41. I-41 reads [𐩠]𐩧𐩹𐩣 ([H] R Ḏ M), and I-42 reads 𐩮𐩵𐩤𐩺𐩵𐩲 (Ṣ D Q Y D ʿ), a personal name attested elsewhere (Robin, 1987, pp. 18–19).

Figure 3.100: View of boulder at S-82, facing northeast.

S-82 عقران (ʿUqrān)

GPS Coordinates: 1755588 N, 239678 E

Large stone with faintly pecked Musnad inscriptions (I-45, I-46) and pecked animal figures (see Figs. 3.100 and 3.101).

3.1.3 Sites from the MHAS 2004 Season

In 2004, a single day of site reconnaissance was conducted in the Wādī Ḥaḍramūt, to the immediate west of Šibām, exploring sites that had been previously noted but not examined closely (see

Figure 3.101: Detail of camel figures pecked into the western face of the boulder at S-82.

Fig. 3.102).

S-83 جوجة ٣ (Jūjah 3)

GPS Coordinates: 1763351 N, 242817 E

This site was discovered in 1994 by the surveying team of the NYU excavations to Jūjah, and a control point was set among its ruins.[32] It is apparently a two-period site, with one or two Pre-Islamic houses, mostly cleared for a modern field, and a single Islamic period house (A-31), with outbuilding. About 350 meters north of A-31 stands a small Islamic village with five houses and a well-preserved mosque (A-32; see Fig. 3.103). The entire complex was given a single MHAS site ID number, but since A-31 and the village are not of the same period, they should be considered two sites, with unique IDs. About 100 meters to the northeast of A-31 is a large, relatively recent, but abandoned well.

The mosque A-32 bears additional mention here, as a likely indicator of the age of the site.

[32] Hansen, 1994, p. 10.

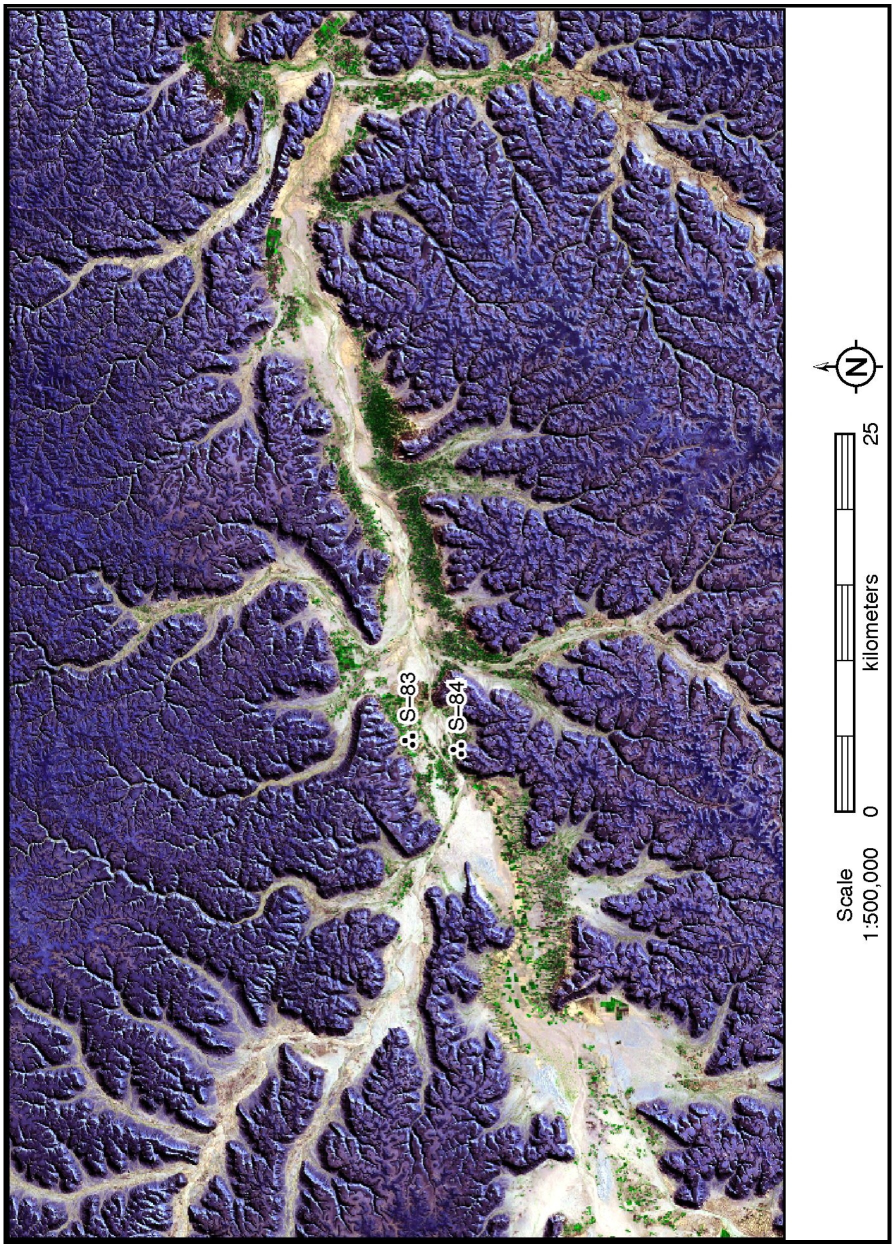

Figure 3.102: Sites visited in the 2004 MHAS field season.

Figure 3.103: North side of mosque A-32 at S-83, facing southwest.

The pointed arches set atop stout columns, in particular, closely resemble those of the ruined ʿAbd Allāh mosque at Bōr and the Bā ʿAlawī mosque in Tarīm.[33] The comparison is not perfect, as the arches of A-32 are more triangular than the other mosques', which bow outward somewhat in the manner of horseshoe arches. Nevertheless, the overall appearance of A-32's construction, as well as its current state of decay, could easily make it their contemporary. And though the ceramics collected at S-83 are nondescript and not especially diagnostic, they are in accord with the presumed 15th century AD date of the mosques at Bōr and Tarīm.

S-84 خشامر - بئر علي ٢ (Ḫašāmar / Biʾr ʿAlī 2)

GPS Coordinates: 1760135 N, 242224 E

Fortress remains on the scree slopes of the southern side of the Wādī Ḥaḍramūt, about 40 meters above the nearest field (see Fig. 3.104). The structure, A-33, appears as a 3 meter high lump of decayed mud brick atop cobble foundations. Traces of interior wall plaster

[33] Lewcock, 1986a, pp. 122–123; Damluji, 1992, pp. 288–306.

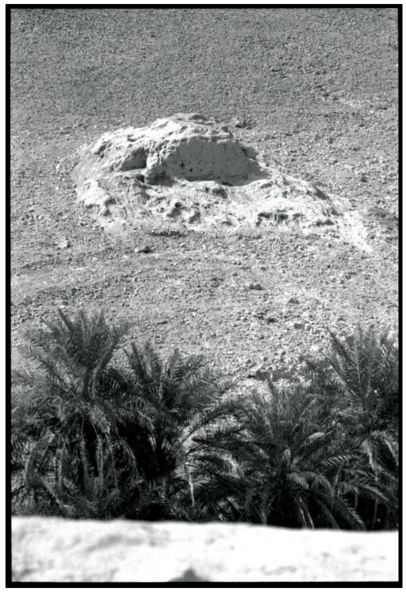

Figure 3.104: Structure A-33 at S-84, facing south.

are still evident, but little can be discerned of the building's floorplan beyond its square footprint.

3.2 Additional Sites from the MHAS 1999 Season

During the 1999 season of the MHAS, a number of sites, beyond those listed above, were spotted but for lack of time were either not visited by us or were only given cursory inspections without proper data collection. The lists below describe the locations and appearance of the sites seen, in hopes that they may be explored in the future.[34]

3.2.1 Sites Seen but not Visited in Wādī Sarr and Its Tributaries (see Fig. 3.105)

Site i Three alignments on the scree to the north of 1763054 N, 228758 E.

[34] Note that the GPS coordinates given are usually those of the location of our truck, at the time that the sites were spotted, and not those of the sites, themselves. Recently, the improved imagery available with Google Earth (see p. 43ff.) has permitted the re-examination of these readings, and in most cases, the sites are plainly visible in the satellite imagery. All of the following GPS coordinates have, therefore, been plotted in Google Earth, and the sites to which they refer have been noted. These data are available for download from the project website (`http://www.lugal.com/mhas/`).

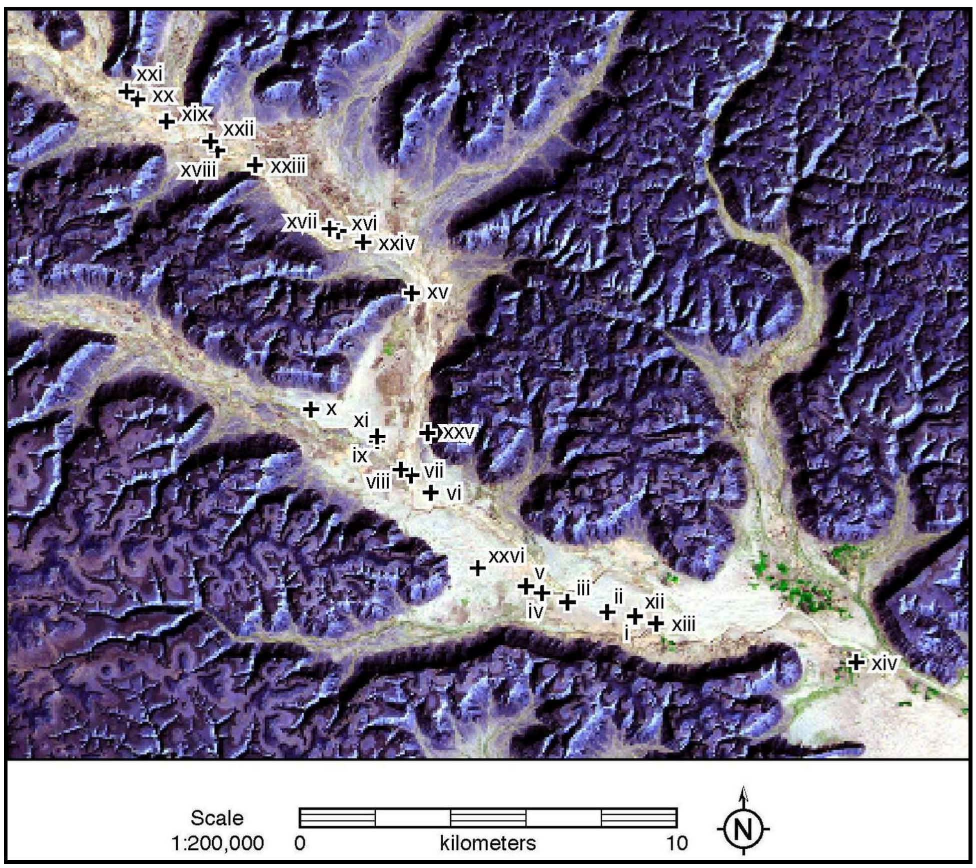

Figure 3.105: Sites seen but not visited in Wādī Sarr and its tributaries.

Site ii One alignment on the scree to the north of 1763232 N, 228001 E.

Site iii Two alignments on the scree, above the first ledge, to the north of 1763494 N, 226946 E.

Site iv Alignments on the scree to the south of 1763737 N, 226270 E.

Site v Two alignments on the scree to the north of 1763915 N, 225846 E.

Site vi One alignment on the scree to the south of 1766398 N, 223320 E.

Site vii Two alignments on the scree to the south of 1766858 N, 222797 E.

Site viii Three alignments on the scree to the south of 1767003 N, 222521 E.

Site ix An alignment on scree at the juncture of two wadis, perhaps 3 kilometers to the north of 1767766 N, 221895 E.

Site x One alignment on the scree to the south of 1768596 N, 220143 E. This line winds up the slope like that of S-70.

Site xi A long alignment on the scree to the northeast of 1767886 N, 221902 E, extending from the wadi almost all the way to the jol.

Site xii A single structure, probably Islamic, in the wadi at 1763118 N, 228737 E.

Site xiii A small settlement, possibly Pre-Islamic, at 1762926 N, 229296 E.

Site xiv Alignments on the scree to the southwest of 1761906 N, 234601 E.

Site xv One alignment on the scree to the northeast of 1771680 N, 222818 E.

Site xvi One alignment on the scree to the east of 1773327 N, 220874 E.

Site xvii Cairns on the scree to the west of 1773390 N, 220642 E.

Site xviii A single structure on the alluvium to the east of 1775462 N, 217660 E.

Site xix Two alignments on the scree to the southwest of 1776224 N, 216312 E.

Site xx A structure on the alluvium about 300 meters south of 1776816 N, 215539 E.

Site xxi Cairns on a ridge to the northeast of 1777025 N, 215258 E.

Site xxii An alignment on the scree to the south of 1775702 N, 217479 E.

Site xxiii Cairns on the first ledge to the south of 1775073 N, 218663 E.

Site xxiv A town site on and around a spur about 1.5 kilometers to the north of 1773028 N, 221525 E.

Site xxv An alignment extending up the slope from 1767977 N, 223235 E.

Site xxvi A village on and around a spur to the southwest of 1764397 N, 224568 E.

3.2.2 Sites Seen but not Visited in Wādī Ḥaḍramūt and Its Minor Tributaries (see Fig. 3.106)

Site i An isolated structure on the scree to the south of 1760974 N, 252781 E.

Site ii An isolated structure on the scree to the south of 1761021 N, 252720 E.

Site iii A structure on the slope to the southwest of 1760945 N, 252363 E, near the village of Qriw.

Site vi A single structure at 1764231 N, 242562 E.

Site v A single structure at 1762668 N, 243570 E.

Site vi A single stucture on a spur to the south of 1762689 N, 258426 E. (Though the field notes do not note it, this is probably the fortress on the jōl.)

Site vii A single structure on a spur to the south of 1755708 N, 235271 E. (Though the field notes do not note it, this is probably the fortress on the jōl.)

Site viii A cairn on a ridge to the west of 1751875 N, 231326 E. (In the satellite imagery, this appears to actually be a natural formation.)

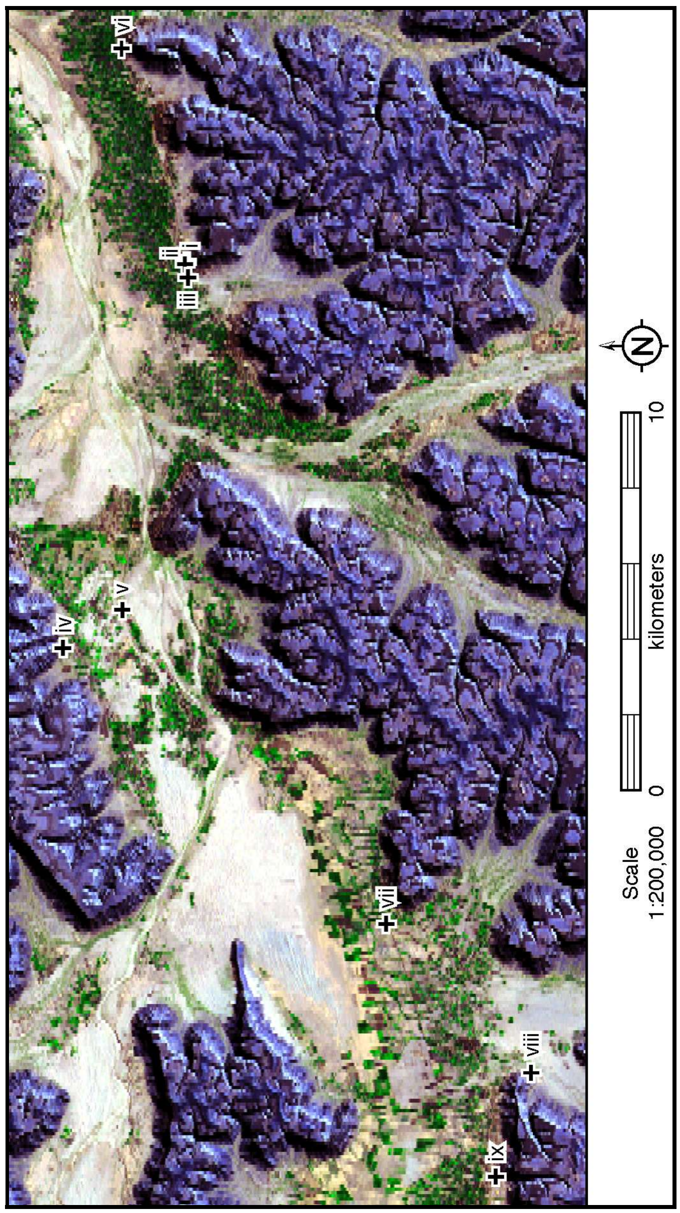

Figure 3.106: Sites seen but not visited in Wādī Ḥaḍramūt and its minor tributaries.

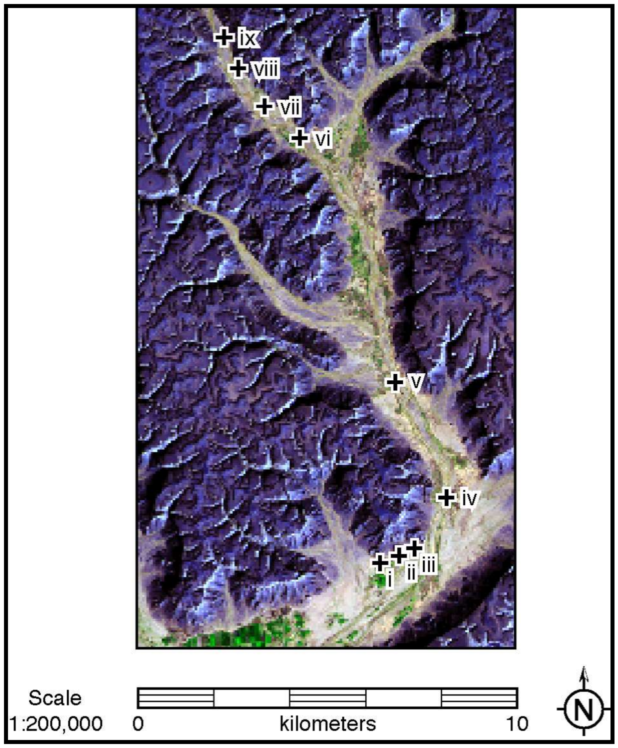

Figure 3.107: Sites seen but not visited in Wādī Jaʿaymah and its tributaries.

Site ix A mine shaft, actually entered by us, at 1752806 N, 228579 E. It is of indeterminate age, may be reuse of an old mine or may be relatively recent. Many other similar mines, some with cinderblock entrances, are in slopes to the east of this mine.

3.2.3 Sites Seen but not Visited in Wādī Jaʿaymah and Its Tributaries (see Fig. 3.107)

Site i A cairn on the scree to the north of 1769960 N, 251997 E.

Site ii A cairn on a spur to the north of 1770149 N, 252499 E.

Site iii Cairns and alignments on the scree to the north of 1770346 N, 252900 E.

Site iv Alignments and cairns on the scree to the west of 1771685 N, 253751 E.

Site v Alignments on a spur to the east of 1774738 N, 252395 E.

Site vi Cairns and a possible lookout on the spur to the northeast of 1781189 N, 249877 E.

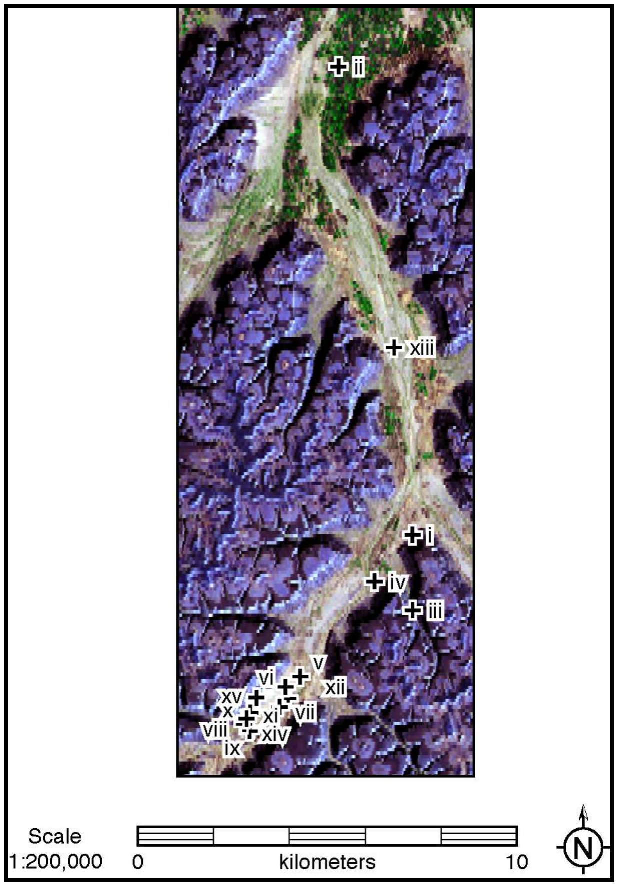

Figure 3.108: Sites seen but not visited in Wādī Bin ʿAlī and its tributaries.

Site vii Foundations of a structure on the spur to the east of 1782022 N, 248947 E.

Site viii A cairn on the scree to the east of 1783034 N, 248244 E.

Site ix A cairn on a ridge to the southwest of 1783849 N, 247876 E.

3.2.4 Sites Seen but not Visited in Wādī Bin ʿAlī and Its Tributaries (see Fig. 3.108)

Site i A path leading up to the jōl from 1747008 N, 250380 E.

Site ii Six structures, apparently lookouts, on the jōl to the west of 1759389 N, 248429 E.

Site iii Two caves in the cliff face, at the level of the wadi bottom, at 1745010 N, 250388 E.

Site iv An alignment on the scree to the east of 1745775 N, 249376 E.

Site v An alignment on the scree to the northeast of 1743254 N, 247419 E.

Site vi Cairns on the scree to the southeast of 1742683 N, 247100 E.

Site vii Three cairns and alignments on the first ledge to the southeast of 1742453 N, 246875 E.

Site viii A cairn on the first ledge to the northwest of 1741874 N, 246111 E.

Site ix Two cairns on the scree to the south of 1741817 N, 246080 E.

Site x A cairn on the scree to the north of 1742015 N, 245936 E.

Site xi Four cairns on the first ledge to the west of 1742302 N, 246100 E.

Site xii Cairns on the first ledge to the west of 1742985 N, 247028 E.

Site xiii Three alignments on the scree to the west of 1751957 N, 249892 E. (In satellite imagery, these appear to be natural formations, and may not actually be manmade.)

Site xiv Cairns and alignments at 1742146 N, 246001 E.

3.2.5 Sites Seen but not Visited in Wādī Ḏahab and Its Tributaries (see Fig. 3.109)

Site i Cairns on the scree to the east of 1781708 N, 274620 E.

Site ii Alignments on the scree to the west of 1779524 N, 275174 E.

Site iii Cairns on the spur to the east of 1778552 N, 275688 E.

Site iv Alignments on the scree to west of 1775266 N, 277434 E.

Site v Isolated structure on a spur to the west of 1774026 N, 278339 E.

Site vi A cairn on the scree to the west of 1773750 N, 278839 E.

Site vii An alignment on the scree to the northeast of 1773404 N, 279174 E.

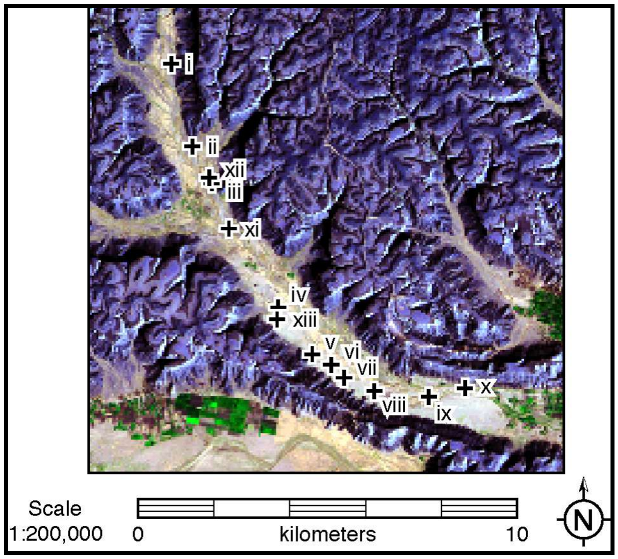

Figure 3.109: Sites seen but not visited in Wādī D̲ahab and its tributaries.

Site viii Roadway leading up the slope to the southwest of 1773052 N, 279974 E.

Site ix Roadway leading up the slope to the east of 1772909 N, 281417 E.

Site x Cairns on a low hill just south of 1773135 N, 282372 E, in the wadi.

Site xi Cairns on the scree to the northeast of 1777352 N, 276137 E, and a turret grave on the jōl above.

Site xii Cairns on a spur to the northeast of 1778695 N, 275613 E.

Site xiii Alignments on the scree to the southwest of 1774950 N, 277407 E.

3.2.6 Sites Seen but not Visited in Wādī ʿIdm and Its Tributaries (see Fig. 3.110)

Site i Caves on the slopes to the southwest of 1761313 N, 285010 E.

Site ii Cairns on the ridge to the southeast of 1747860 N, 283792 E.

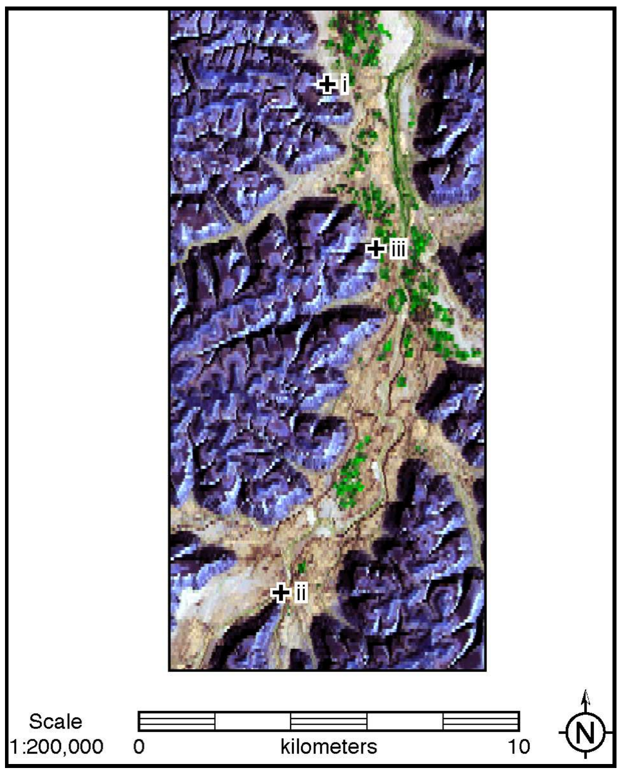

Figure 3.110: Sites seen but not visited in Wādī ʿIdm and its tributaries.

Site iii Isolated structure on a spur to the west of 1756958 N, 286295 E. (This may refer to a structure on the jōl, but neither the field notes nor the satellite imagery provide sufficient detail.)

3.3 Additional Sites from non-MHAS Projects

In addition to the MHAS reconnaissance, a number of other projects have explored the Wādī Ḥaḍramūt. Though their methods, the intensiveness with which they surveyed, and their archaeological expertise varied greatly, a number of sites throughout the region have been found in the past century. Though some of these sites are discussed above, others, for lack of time, were not visited by us. Nevertheless, in the interest of presenting the most complete site catalog possible, other projects' sites are presented below.[35]

3.3.1 Sites from the Bents' Expedition

In 1893–94, Theodore and Anna Bent, a British missionary couple, were the first Europeans with archaeological expertise to penetrate the central Wādī Ḥaḍramūt (i.e., the MHAS study area). Though the detail with which they described the sites to which they were taken is not great, they do provide worthwhile data.

On their entry into Wādī Ḥaḍramūt, they were taken to a site near Qaṭn named "Al Agran." By their description, this is most likely a Pre-Islamic hillside temple complex, the foundations of which had (at their time) been incorporated into modern houses.[36] Most likely, this site is in the area of ʿUqrān—and though it clearly is not the same as S-82 (a graffiti site), it is perhaps related. More importantly, though, if it is indeed a temple site, one would expect a settlement in

[35] Undoubtedly, other unpublished sites are also known to various researchers, locals, and GOAM employees. Insofar as the details of these sites is not publicly known, however, they cannot be presented herein. Note, too, that the sites presented in this section are culled primarily from archaeological expeditions. Explorers, diplomats, and others who visited the wadi but who, for lack of access or training, did not record useful archaeological data are not considered here.

[36] Bent, 1900, p. 124.

the vicinity. Such a settlement site, however, was not found by the MHAS survey.[37] Clearly, this part of the wadi deserves further study.

The Bents also traveled up the Wādī Sarr, stopping *en route* to visit Qabr an-Nabī Ṣāliḥ (S-72). They described the tomb as a long pile of stones, and make no mention of an enclosure[38]—suggesting the tomb was renovated, its enclosure was constructed, and the enclosure's ceiling had collapsed, in the four decades between their visit and Ingrams' photograph (see n. 23, above). Continuing on their journey up the Wādī Sarr, they discovered the inscribed stone at S-74. This they photographed, and sent the photograph to D. H. Müller for analysis.[39] Unfortunately, the disposition of their photographs, and whether or not it was ever studied by Müller, is not known. On their return to the main wadi, they stopped to explore al-Markazāt (S-73).[40]

Later, while staying at Šibām, they were taken to see a Pre-Islamic inscription, painted and boustrophedon, near the village of Ḫamūr. This village lies immediately to the east of Ḫašāmar, and the inscriptions found there may be related to the settlement at S-23. Leaving the Wādī Ḥaḍramūt via the Wādī Bin ʿAlī, they stopped at Ḥiṣn Bā Hazayl (S-50), which they were told was built on Pre-Islamic foundations.[41] The foundations of A-17 are, indeed, quite massive and imposing (see Fig. 3.62, above), so the claim is not unreasonable.

3.3.2 Sites from the Van der Meulen and von Wissmann Expedition

Perhaps the earliest scholarly exploration of the Wādī Ḥaḍramūt was undertaken in 1931 by Van der Meulen and von Wissmann. Though still a travelogue of sorts, their 1932 publication is rich in

[37] Sedov, on the other hand, gives a map of the site of ʿUqrān (Sedov, 2005, Fig. 55), but it is unclear what its source is (though probably the SoYCE expedition), and recent examination of the region in satellite images yields no obvious candidates. Sedov writes that "the ancient settlement is preserved as a tell," now totally covered by the modern village of ʿUqrān (Sedov, 2005, p. 136)—which would place it about 500 meters west of S-82. There is a large area on the wadi floor to the east of S-82 with features that might be the foundations of a Pre-Islamic settlement. The satellite images are unclear, but could be easily verified with ground survey.

[38] Bent, 1900, p. 131

[39] Bent, 1900, p. 129.

[40] Bent, 1900, p. 134.

[41] Bent, 1900, p. 166.

ethnographic and geographic information.[42] Their travels took them to numerous archaeological sites, and the work also produced an exceptionally detailed map.[43] Entering the Wādī Ḥaḍramūt via the Wādī Dūʿan, Van der Meulen and von Wissmann visited the sites of Raybūn and another near Ḥurayḍah.[44] They then traveled through the Wādī Ḥaḍramūt proper without mentioning additional ruins until they reached Tarīm, and were taken to a small site in that city's western suburbs.[45] This site was not reached by the MHAS survey, but is apparently located on and about one of two distinct spurs, now engulfed by the suburban sprawl.[46] South of Tarīm, in the Wādī ʿIdm, they were taken to visit the site complex near Sūnah, which they compared to Raybūn.[47] East of Tarīm, toward Qabr Hūd, the explorers visited the sites of Ḥiṣn al-ʿUrr, Makaynūn, and Ṯawbah, with the express intent of collecting Pre-Islamic inscriptions.[48] These sites, however interesting, lie outside the MHAS study area.

3.3.3 Sites from the Egyptian University of Cairo Expedition

In 1936, a small multidisciplinary team from the Egyptian University of Cairo explored highland Yemen and the Wādī Ḥaḍramūt. Though their interests covered many fields of the natural and social sciences, considerable effort was apparently expended in the Wādī Ḥaḍramūt—particularly at Raybūn—collecting archaeological data. Published in only the most minimalist of formats,[49] they do briefly discuss graffiti, inscribed pottery, and obsidian microliths—all features of Pre-Islamic culture in the Wādī Ḥaḍramūt which would later be studied more intensively by other researchers (especially Caton-Thompson in the following year).

[42] Van der Meulen and von Wissmann, 1932.

[43] von Wissmann, 1932.

[44] Van der Meulen and von Wissmann, 1932, pp. 84–87, 94.

[45] Van der Meulen and von Wissmann, 1932, p. 139.

[46] This is probably the site of "Mawla ʿAydīd," mentioned in Damluji, 1992, p. 246. Examination of the area in Google Earth shows only a few possible traces of a site atop the larger spur, and the top of the neighboring spur appears to have been recently leveled, such as with bulldozers.

[47] Van der Meulen and von Wissmann, 1932, pp. 145–146.

[48] Van der Meulen and von Wissmann, 1932, pp. 172–179.

[49] Huzayyin, 1937, pp. 513–514.

3.3.4 Sites from Caton-Thompson and Gardner's Survey

The archaeological excavations at Ḥuraydah, carried out under the direction of Gertrude Caton-Thompson in 1937–38, augmented by a small amount of regional archaeological reconnaissance and Elinor Gardner's geological survey, was the first scientific archaeological project in South Arabia, and would remain the only one for over a decade. The focus of their work was in the western tributary Wādī ʿAmd, southwest of the MHAS study area—but prior to the commencement of their excavations they cursorily explored the main wadi, too.

The team entered the Wādī Ḥaḍramūt near Tarīm, above which they discovered a palaeolithic site.[50] They also collected obsidian microliths from Sūnah[51] and an unnamed site near Šibām—probably one of the Jūjah sites (S-24, S-26, or S-27). Other lithics were collected from the scree slopes near Tarīm,[52] the scree slopes of a minor tributary to the east of Sayʾūn,[53] and a couple of sites in the vicinity of Šibām.[54] Caton-Thompson and Gardner note, too, that inspections of Maryamah (S-29) and aṣ-Ṣanāhajah (S-30), both Islamic settlements, yielded no microliths like those found at Sūnah and Raybūn.[55] Aside from the Wādī ʿAmd sites (which are, at any rate, outside of the MHAS study area), none of their sites are described in any great detail—and, as no maps are provided, their exact location is never certain.

Two graffiti sites within the MHAS study area were also visited by Caton-Thompson's team, one in the Wādī Jaṯmah, southeast of Sayʾūn, and one in Šiʿb Jūjah, northeast of Šibām. Inscriptions from these sites are published by G. Ryckmans.[56] These inscriptions likely come from more than one boulder at each location—so, if they had been recorded by MHAS, would probably have been listed as multiple sites. Also of note, inscription 65 is mislabeled as coming from Wādī

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[50] Caton-Thompson, 1953, pp. 208–209; This site, located mostly on the jōl, is technically outside of the MHAS study area.

[51] Caton-Thompson and Gardner, 1939, p. 31; Caton-Thompson, 1944, pl. LX.

[52] Caton-Thompson, 1953, pp. 204–208.

[53] Caton-Thompson, 1953, pp. 202–204.

[54] Caton-Thompson, 1953, pp. 210–211.

[55] Caton-Thompson, 1944, p. 134.

[56] Caton-Thompson, 1944, pp. 180–184; Pls. LXIX–LX.

Jaṯmah, when it is in fact one that is inscribed upon the main boulder at S-75.

3.3.5 Sites from Harding's Survey

In 1959 and 1960, G. Lankester Harding conducted and archaeological survey in the Aden Protectorate for the British Colonial Office.[57] His work ranged across the Protectorates, including the Wādī Ḥaḍramūt. Within the main course of the wadi, however, he only found the sites at Ḥiṣn al-ʿUrr and Makaynūn—both in the Wādī al-Masīlah to the east of the MHAS study area, and therefore not of immediate concern here. Within the Wādī Ḥaḍramūt proper, he notes that "the very numerous ruins marked on von Wissmann's map are all of recently deserted villages"[58]—though he does say that the presence of graffiti near Šibām and Sayʾūn (presumably in reference to Caton-Thompson's discoveries) suggest Pre-Islamic occupations in their vicinities.[59]

In the Wādī ʿIdm, which he treats as part of the Wādī Ḥaḍramūt, Harding discusses Mašġah at some length.[60] In his description of the site, he notes that it has been badly disturbed by soil excavation, leaving some structures high atop pedestals of undisturbed accumulation and interrupting the site's stratigraphy. He also notes the destruction to the site's eastern edge by sayl floodwaters in the Wādī ʿIdm, and that the numerous irrigation installations in the area (such as S-45) have been quarried for paving stones for the Sultan's road.

3.3.6 Sites from the Smithsonian Institution Survey

Under the direction of Gus Van Beek, the Smithsonian Institution sponsored a major survey in the Wādī Ḥaḍramūt in 1961–62.[61] This survey covered roughly the same territory as the MHAS study area, but also included the jōl, where accessible. As with the present survey, the Smithsonian survey sought to document sites of all archaeological periods, though the researchers' academic

[57] Harding, 1964.

[58] Harding, 1964, p. 40.

[59] Harding, 1964, p. 40.

[60] Harding, 1964, pp. 40–42; pls. XXX–XXXIV, XXXVI.

[61] Van Beek, Cole, and Jamme, 1963.

interests gave greatest emphasis to the discovery of stone age and Pre-Islamic sites. Unfortunately, despite the intervening years, the project as a whole has only been published in preliminary format and without maps. Until such time as final publication is completed, therefore, direct comparisons between the two projects' findings is difficult. Nevertheless, the published photographs (discussed below) do provide some points of comparison.[62]

Plate 3.1 This photograph shows a Neolithic site on "a low spur at the junction of two wadies near Qatn."[63] Judging by the profile of the cliff in the background, this site may be located to the southeast of S-80. The caption also mentions the presence of a site "on the bench of the lower cliff-forming limestone across the wadi."

Plate 3.2 This photograph shows a lithic site near Sayʾūn. Presumably, this site is in Wādī Jaṯmah, to the south of the city, and may have since been overrun by the expanding suburbs of that city.

Plate 5.1 This photograph shows an overview of al-Markazāt (S-73). Plate 5.2 also shows a detail of one of the standing stones. Van Beek, in the text of the article, discusses the significance of the site, suggesting possible cultural influences upon the pattern inscribed upon the stone.

Plate 6.1 This photograph shows a structure near Qaṭn that Van Beek claims is Pre-Islamic in date, and may be a caravansary. No such structure was found by us, but identification of this site (if it still exists) and examination of its ceramics could be quite useful for understanding the regional economic history.

Plates 6.2 and 7.1 These photographs show the site of Mašġah.

Plate 8.1 This photograph shows the "remains of an early Islamic village built on an outlier east of Seiyun." Though the archaeological remains are not easily visible in the photograph, the spur itself is very distinctive, and finding the site again in the future should pose no great

[62] Fortunately, Dr. Van Beek informs me that he still intends to publish the results of the survey, and hopes to do so soon.

[63] Van Beek, Cole, and Jamme, 1963, pl. 3.1.

difficulty (see also Fig. 3.111, below). In fact, it is quite likely that this site is either Qalʿat al-Ḥabūẓī (S-56) or Qalʿat Maryamah (S-28)—neither of which were photographed by me from an angle that permits positive identification with this site.

Plate 8.2 This photograph shows aṣ-Ṣanāhajah (S-30). Here, a large settlement is clearly visible on the lower scree and wadi bottom to the east of the spur. When visited in 1999, this lower occupation was only noted in the field book in passing. It would be beneficial, in the interest of gauging site preservation more thoroughly to compare the site, as it currently stands, with the photographs from the 1960s. Also of interest, with regards to the dating of the site, is Van Beek's presumption that the site is relatively recent.[64]

For his contribution to the *Araby the Blest* collection, Donald Whitcomb was given access to Van Beek's Islamic period ceramics, and provides us with a map and seriation of those sites.[65] These sites are heavily concentrated along the northern slopes of the Wādī Ḥaḍramūt, between Sayʾūn and Tarīm—an area underrepresented in my survey, and therefore very complementary to it (see Fig. 3.111).

Site 1 Two sherd scatters and the remains of a small mud brick building on the scree slopes.

Site 2 Khalif el-Burrga. Small stone building on a spur.

Site 3 Abandoned well.

Site 5 Sherd scatter on the scree.

Site 6 Sherd scatter on a spur about 50 meters east of Site 5.

Site 7 Qar et-Tas. Ḥiṣn atop a spur.

Site 16 Bel-Habban. One of three mud brick structures on the scree in the vicinity.

Site 17 Husn Muttahar. Large mud brick fortress on the scree.

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[64] I agree with Van Beek's assessment, but it stands in opposition to the belief conveyed to me when I visited it that the town was abandoned during the Islamic expansion (see p. 87, above).

[65] Whitcomb, 1988.

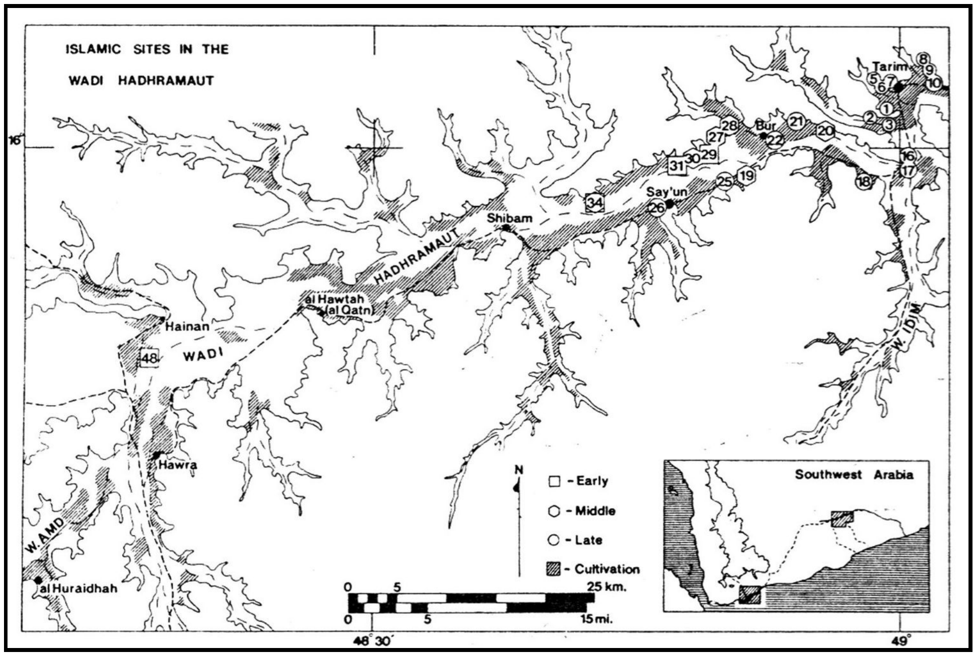

Figure 3.111: Islamic sites in the Wādī Ḥaḍramūt (From Whitcomb, 1988, Map 1).

Site 18 Aṣ-Ṣanāhajah (S-30). Here given as “el-Qarra.”

Site 19 Qarat Hawtah as-Sultanah. Mud brick structure(s) atop a spur.

Site 20 Qarat el-Harargeh Bor. Mud brick structure on the first ledge.

Site 21 Qarat Ali Bin Hassan. A series of mud brick structures on the first ledge.

Site 22 Qarat Berrai. Recently abandoned site of unspecified type in the alluvium.

Site 25 Qalʿat Maryamah and Maryamah (S-28 and S-29).

Site 26 Qarat Sheikh Ali. A series of mud brick structures on the slopes.

Site 27 Qarat Salilih el-Qadim. Stone foundations atop a spur.

Site 28 Qarat Salilih el-‘Adi. Mud brick structure atop a spur 300 meters north of Site 27.

Site 29 Settlement, partially excavated for its soils, in the alluvium.

Site 30 Qalʿat al-Ḥabūẓī (S-56). Here given as "Qarat el-Habuthi."

Site 31 Sheblilih. Series of low mounds in the alluvium, exposed by soil excavation.

Site 34 Matargah. Settlement spread across two spurs and the wadi bed around and between them.

3.3.7 Sites from the Mission Française Survey

In 1978 and 1979, as a supplement to the French excavations at Šabwa, archaeological survey, under the direction of Jean-François Breton, was conducted into the interior Wādī Ḥaḍramūt.[66] Though data were collected throughout the region covered by the MHAS survey, publication concentrated on the most spectacular edifices—and high quality architectural plans of Pre-Islamic houses and temples at Sūnah, Mašġah, al-Hajrah, Makaynūn, Ḥiṣn al-Qays, Raybūn, and Bā Quṭfah were drawn.[67] Of these sites only Sūnah and Mašġah fall within the MHAS study area—and a general dearth of major Pre-Islamic sites in the main wadi is noted.[68] However, photocopies of the project's sketch maps held at the Sayʾūn Museum show a number of other sites that were never properly published.[69] The contents of these maps is discussed below.

Map: "Ruins near Safulah" In the Wādī Bin ʿAlī, a short distance north of the town of Safūlah, this map shows a site marked "ruins area." The nature of those ruins is unspecified, but appear to be canals or dams in the middle of the wadi. Judging by its location, this site may in fact be the same as S-4 (Samūʿah). In the published volume of the survey findings, "Safula" is also mentioned, in passing, among a list of sites (including Raybūn and Sūnah) having substantial irrigation works supportive of nearby settlements.[70] Exactly which ancient site may be associated with these particular ruins, however, is unknown, as no such site has yet been found.

[66] Breton, 1979b; Audouin, 1997.

[67] Breton, Badre, Audouin, and Seigne, 1982.

[68] Breton, 1979b, p. 428.

[69] Anonymous, 1978.

[70] Breton, Badre, Audouin, and Seigne, 1982, pp. 7–8.

Map: “Samurah Ruins” In the Wādī Ḫōnab, near its confluence with the Wādī Sarr, a midsized settlement site is marked on this map with the name “Masurah.” Though the map is somewhat unclear, this site must lie near the southern escarpment, a short distance to the east of S-71 and perhaps directly south of S-70.

Map: “W. Juhaymah >hadramut” This map shows three archaeological sites, possibly Islamic, including “ruins & irrigations” [*sic*] in the Wādī Jaʿaymah. Their exact location in the wadi is difficult to ascertain because of the map’s scale, but appears to be at the confluence of Wādī Nām and Wādī Jaʿaymah, slightly to the west of the village of Jʿaymah, about midway between S-8 and S-18.

Map: “Ghuraf” This map shows the location of al-Ġuraf (S-35), including a detailed plan of the mound and a section elevation of structure A-12. (The plan, however, bears very little resemblance to my own sketch plan, M-7.) Also indicated on the map is a circled area with a question mark. The significance of the question mark is not explained, but the circled area is roughly the same region as ʿĀdīyyat al-Ġuraf 2 (S-32).

Map: “Shaab Jujah” This sketch plan of the Jūjah region provides an interesting contrast to the survey work conducted by the MHAS (see Fig. 3.112). Whereas some of the MHAS sites are easily identified in the French map, the map is inaccurate enough that correlation of all its features with those in other maps and satellite images is impossible. Nevertheless, the French map is useful in that it confirms the density of sites in the area—including a number of graffiti sites and caves that I overlooked.[71] The detail sketch plan of S-24 also shows that the soil excavation at that site was carried out after 1978 or 1979.

3.3.8 Sites from the SoYCE Mission

From 1983 to 1991, a joint project between Soviet and Yemeni researchers, the Soviet-Yemeni Complex Expedition (SoYCE), worked in the former PDRY. This project consisted of ethno-

[71] Also present among the photocopied sketch maps at the Sayʾūn Museum is a page of copies of inscriptions from the area around Jūjah, and S-75, in particular.

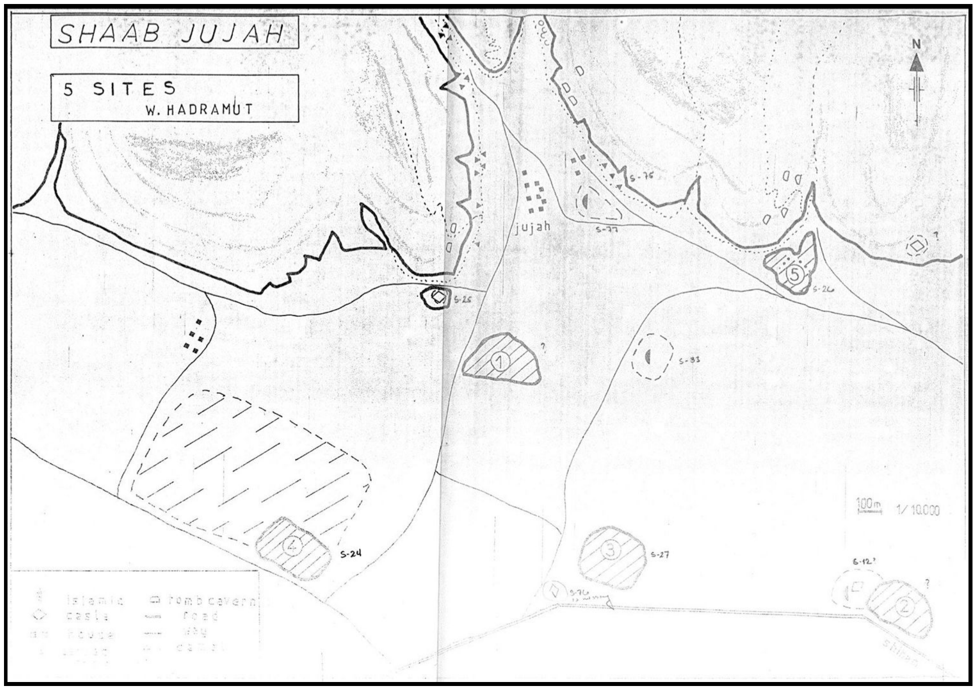

Figure 3.112: Photocopy of the sketch map of the Jūjah area compiled by the French survey.

graphic, linguistic, and archaeological components, but its archaeological interests were the greatest—and the lion's share of their archaeological research was carried out in the western Wādī Ḥaḍramūt and its western tributaries.[72] Major excavations were carried out at the Pre-Islamic site of Raybūn in the Wādī Dūʿan, though other small-scale excavations and surveys were also undertaken.

Although no published indication is given of archaeological attention paid to the Jūjah–Šibām region of the Wādī Ḥaḍramūt, one photocopied sketch map labeled "Shibam/90. A.A., A.T./SOYCE" is held in the Sayʾūn Museum (see Fig. 3.113). This plan, though less detailed than the French map (see Fig. 3.112, above), is somewhat more accurate. On it are three archaeological sites, marked *J.I*, *J.II*, and *J.III*, corresponding to S-24, S-26, and S-83, respectively. The Jūjah excavations used the SoYCE names for these three sites, and MHAS then inherited this naming scheme.

[72] Piotrovskij and Sedov, 1994.

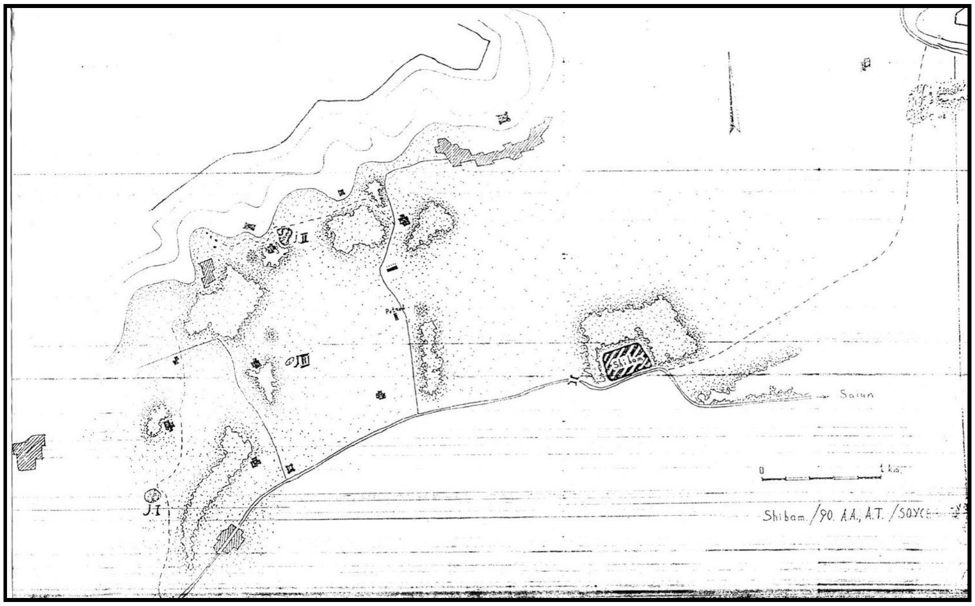

Figure 3.113: Photocopy of the sketch map of the Jūjah area compiled by SoYCE.

Furthermore, a short publication about al-Ġuraf (S-35) in the Wādī ʿIdm shows that SoYCE did, in fact, have some substantive penetration into the interior.[73] Unelaborated upon in the article, their map of the Wādī ʿIdm shows four sites: al-Ġuraf, Mašġah, Sūnah, and Hiḍbat Krōshan.[74] Whereas the first three sites are well known, Hiḍbat Krōshan is not. In Wissmann's map, this name is given to the ruin fields of Sūnah (von Wissmann, 1932), but in Sedov and as-Saqqaf's publication it is shown approximately the same location as Ḥakmah (S-46).

3.3.9 Sites from the NYU Excavations at Jūjah

In addition to excavations at S-24, in 1994 the NYU expedition also surveyed the surrounding area. A total station was employed to locate S-26, S-27, S-76, and S-83 on the S-24 site grid, and topographic maps were made of S-24, S-26, and S-27.[75] In addition to the mapping project, NYU researchers also visited local graffiti sites northwest and northeast of S-24, in Šiʿb Bā Ḫarbah and

[73] Sedov and al Saqqaf, 1996.

[74] Sedov and al Saqqaf, 1996, Fig. 1.

[75] Hansen, 1994, pp. 8–11.

Šiʿb Jūjah, respectively.[76] These sites, unfortunately, are not mapped, and their descriptions don't afford positive identification, but we can be reasonably certain that one of the latter group is the same as S-75.[77]

3.3.10 Sites from the RASA Survey

In 1998 survey and excavation were carried out on the southern jōl and the southern reaches and tributaries of Wādī ʿIdm by the Roots of Agriculture in South Arabia (RASA) project.[78] The northernmost areas reached by that project overlap somewhat with the southeast corner of the MHAS study area. Notably, sites were found in the Wādī Kouwa, and a major aceramic post-Neolithic settlement was found in Šiʿb Munaydar. The latter, probably reused over centuries, is especially noteworthy for its similarity to S-53 (and, to a lesser extent, S-68), near the southern edge of the MHAS study area in the Wādī Bin ʿAlī.

3.3.11 Sites from the HDOR Survey

The French Mission to Yemen has had an ongoing series of interrelated surveys and excavations, ranging across the entire country. In the eastern Wādī Ḥaḍramūt, surveys were carried out in the early part of this decade under the name "HDOR." In this survey, nearly 500 prehistoric sites were documented, mostly in the Wādī Wašʿah—a northern tributary of the Wādī al-Masīlah.[79] Though this is beyond the eastern boundaries of the MHAS study area, other zones covered by the HDOR survey include the jōl north of Tarīm and brief excursions into the other tributaries of the Wādī Ḥaḍramūt (such as the Wādī Sarr—see the discussion of S-73, above).

Many of the participants of the HDOR survey have also worked on the subsequent French excavations of Makaynūn. Though excavations at that site are ongoing and publications are only

[76] Hansen, 1994, pp. 14-15.

[77] Of interest, the name "Šibām," written in Musnad characters, is found repeatedly among the Šiʿb Jūjah group (Hansen, 1994, p. 15).

[78] McCorriston, 2000.

[79] Steimer-Herbet, Davtian, and Braemer, 2006, p. 257.

slowly trickling out,[80] this project will certainly be a valuable contribution to the archaeology of the Pre-Islamic Wādī Ḥaḍramūt—potentially rivaling the contributions of the SoYCE excavations at Raybūn. As this site is located in the Wādī al-Masīlah, the MHAS survey has not been directly concerned with it. Nevertheless, the ceramic and architectural evidence (and the chronological sequence and societal structure inferred) are quite complementary to the work previously done at sites such as Šabwa, Raybūn, and Jūjah. It is expected that future publications of the Makaynūn excavation data will strengthen our understanding of the culture and history of the ancient kingdom of Ḥaḍramūt.

3.3.12 Sites from the Italian Survey

A joint Italian Ministry of Foreign Affairs and World Bank funded project was undertaken in the early 2000s to document the cultural and archaeological monuments of the Wādī Ḥaḍramūt.[81] By all indications, this was a serious attempt to create a comprehensive architectural survey and an accompanying full-color atlas. Unfortunately, however, the project never reached publication, and only a handful of proof copies were ever printed. (In 2004 I briefly saw one of these proofs, and was impressed by its apparent comprehensiveness, but could not examine it with any care.) Though the primary researchers hope to some day publish their work (*pers. comm.*), no copies could be secured for the present study.

[80] See, for example, Mouton, Benoist, Schiettecatte, Arbach, and Bernard, 2006.

[81] UNESCO, 2002.

Chapter 4

Ceramics

4.1 Overview of the Ceramics Collection

Simple unsystematic "grab bag" surface collections were made on each site visited by MHAS. Of those collections, ceramics were found on 42 sites, and no ceramics were found on the other 38 sites. Sherds were selected on-site, at the time of collection, and those which were deemed non-diagnostic were discarded immediately. The remaining sherds all contain formal or decorative elements that were expected *a priori* to be helpful for reconstructing the regional chronology.[1] In the lab, these sherds were measured, described textually, and photographed (front and back). 70% were also drawn, and these data were all entered into the project database. The full catalog of MHAS ceramics can be found online at `http://www.lugal.com/mhas/`.[2]

Following both the in-field selection process and the subsequent pruning process, 391 individual sherds remained for study. Of those, joining sherds and sherds suspected to belong to a single vessel are presented in Table 4.1. Among the entire corpus of sherds studied in this project, the breakdown of ware types and tempers is given in Table 4.2.[3] Sherd types and vessel forms are presented in Table 4.3 and Table 4.4, respectively. (Note, however, that these tables present aggregates of surface collections at all MHAS sites. They are, therefore, only useful for examining the collection as a whole, but are not reliable indicators of the proportions of different forms on any particular site or at any particular time period.) Overall, Tables 4.2 and 4.4 show a predominance of common ware bowls and jars. In general, then, instances of other ware types or vessel

[1] Some sherds, mostly rims and handles, have been found upon subsequent study to be insufficiently diagnostic of vessels from particular time periods. Nevertheless, despite their deficiency in constructing chronology, these sherds remain in the catalog and are referenced below. Non-diagnostic body sherds which entered the project catalog, however, were removed from the database during their analysis. The tables of simple statistics presented below are drawn subsequent to this final pruning stage.

[2] The remaining 30% of the sherds collected were not drawn for lack of time. Also, because, during analysis, it was also found that an unnecessarily large number of sherds were collected on sites S-13 and S-14, four bags of sherds from S-13 (B-17 through B-20, for a total of 46 pieces) and one bag of sherds from S-14 (B-22, containing 19 pieces) were photographed as groups, but not analyzed or cataloged in any manner.

[3] In addition to the counts listed, the temper of seven common ware sherds was inadvertently not recorded. Omission of these seven sherds does not significantly affect the statistics given.

forms are more valuable for constructing the ceramic typology. The predominance of rim sherds in Table 4.3, on the other hand, is most likely simply a reflection of our field collection practices.

Site	Joins
S-18	C-319, C-320
S-34	C-174, C-179
S-34	C-178, C-180
S-35	C-10, C-12, C-13
S-41	C-153, C-155, C-156, C-161, C-165
S-43	C-14, C-25
S-43	C-15, C-30, C-31
S-43	C-16, C-18
S-43	C-17, C-21, C-23
S-43	C-20, C-22, C-27
S-46	C-344, C-345
S-46	C-355, C-356
S-48	C-33, C-36
S-51	C-87, C-90
S-51	C-89, C-92, C-96
S-54	C-136, C-137
S-78	C-75, C-80
S-78	C-79, C-81
S-84	C-381, C-382, C-383

Table 4.1: Groups of joining sherds and possible joins.

4.2 Site-by-Site Ceramics Collections

Of the full list of sherds collected, a representative selection (of up to ten sherds per site) is presented below. Each sherd is briefly described and illustrated with drawings and/or photographs. In each case, an attempt has been made to date the sherds by comparison to similar sherds from other sites and published examples. Fuller descriptions of decorative motifs, formal types, and chronology are presented at the end of this chapter.

The comparanda given for each sherd described below is not intended to be exhaustive. Instead, I have sought to present the reader with the geographically closest analogue. Because of the relative lack of published ceramics typologies for the region, and because of the sometimes high

Ware Type	Temper
Common Wares 296 sherds collected (76% of total)	131 (44%) grit temper 82 (28%) chaff and grit temper 53 (18%) chaff temper 10 (3%) no temper visible 6 (2%) sand temper 5 (2%) chaff and sand temper 2 (1%) grit and sand temper.
Porcelain Wares 36 sherds collected (12% of total)	36 (100%) no temper visible.
Coarse Wares 34 sherds collected (9% of total)	14 (41%) grit temper 12 (35%) chaff and grit temper 8 (24%) chaff temper.
Stonewares 20 sherds collected (5% of total)	19 (95%) grit temper 1 (5%) chaff and grit temper.
Fine Wares 5 sherds collected (1% of total)	3 (60%) sand temper 2 (40%) no temper visible.

Table 4.2: Counts of the various ware and temper types.

Sherd Type	Count
Rim	217 (56%)
Body	74 (19%)
Base	54 (14%)
Body and Handle	10 (3%)
Handle	9 (2%)
Whole Profile	6 (2%)
Neck	6 (2%)
Handle and Rim	5 (1%)
Body and Rim	4 (1%)
Base and Body	2 (1%)
Body, Handle, and Rim	1 (<1%)
Rim and Spout	1 (<1%)
Neck and Rim	1 (<1%)
Base, Body, and Handle	1 (<1%)

Table 4.3: Counts of the various sherd types.

Vessel Type	Count
Bowls	109 (27.9%)
Jars	82 (21.0%)
Cups	38 (9.7%)
Ziyār	13 (3.3%)
Bottles	8 (2.1%)
Plates	4 (1.0%)
Lids	3 (0.8%)
Pans	2 (0.5%)
Pipe Bowl	1 (0.3%)
Unknown	131 (33.5%)

Table 4.4: Counts of vessel forms.

degree of regional variability in the ceramics assemblages of inland South Arabia,[4] the production of a full typology of MHAS sherds would, in and of itself, constitute a dissertation. Nevertheless, the comparanda given serve as useful starting points for a comprehensive study of MHAS ceramics.

The primary sources for Pre-Islamic comparanda are the Jūjah excavation report[5]—Jūjah being located in the geographic center of the MHAS study area—and an unpublished ceramic sequence of Raybūn[6] Of these two sources, the former is heavily based upon the latter—but with Jūjah's central location in my study area and my participation in that site's excavation, the evidence of its ceramics bears more weight in the present discussion. Other publications of the SoYCE projects are also useful,[7] as are Caton-Thompson's publication of the excavations at Ḥuraydah[8] and the publication of the ceramic sequence of the French excavations at Šabwa[9]. As of the time of this writing, ceramics from the recent French excavations at Makaynūn have not been published.

[4] Statement of this variability should, however, be tempered by mentions of certain widely distributed forms such as the "Wavy Rim Bowl" of the Pre-Islamic period (see Glanzman, 2004) and trade goods such as the ubiquitous Chinese porcelain cups and bowls of the Late Islamic period.

[5] Hansen, Ochsenschlager, and al Radi, 2004

[6] Sedov, 1998.

[7] Griaznevich and Sedov, 1995; Piotrovskij and Sedov, 1994; Sedov, 1995a; Sedov, 1996a; Sedov and al Saqqaf, 1996.

[8] Caton-Thompson, 1944.

[9] Badre, 1991

It is expected, however, that given that site's proximity, its collections will be quite closely related to MHAS ceramics, and will further illuminate this project's findings. In general, though, the aptness of the comparative materials decreases with increased distance from the MHAS study area, such that the excavation reports from sites of the neighboring Pre-Islamic South Arabian trading kingdoms share only a generic similarity, but few direct parallels to MHAS ceramics.

In the Islamic period, the difficulty of finding suitable ceramics comparanda is heightened. The reasons for this are twofold: on the one hand, less archaeological attention has been paid to the Islamic period than to the Pre-Islamic period in the Wādī Ḥaḍramūt, and on the other hand, regional variability of local ceramics is apparently far greater in the Islamic period. The primary source for Islamic period comparanda has been Whitcomb's study of the ceramics collected by Van Beek's survey,[10] but other useful publications come from the recent French surveys and excavations on the Arabian Seacoast of Ḥaḍramūt and Mahrah.[11] Notably, with the exception of the aforementioned Chinese porcelain cups and bowls, there are far fewer imported wares collected by the MHAS than is typical of the coastal sites. In conjunction with the regional variability of locally-produced ceramics, this underscores the general sense of isolation in the Wādī Ḥaḍramūt in much of the Islamic period.

4.2.1 S-4 Ceramics

The sherds collected on S-4, mixed and in generally poor preservation, range in dates from the Early Raybūn phase of the Pre-Islamic up to the Late Islamic period. Since this site is revealed in a recent gully amid agricultural fields in the middle of the wadi, the variability and poor condition is not unexpected. Lacking secure context, we cannot use these to argue for specific details of the site's history, but they do illustrate demonstrate a historical presence in the vicinity.

C-188 Rim sherd of a large vessel of unknown type. Coarse black ware with chaff and grit temper. 38cm diameter. Thickened vertical band. Impressed horizontal striations. Wheel

[10] Whitcomb, 1988; Van Beek, Cole, and Jamme, 1963.

[11] Hardy-Guilbert and Rougeulle, 1997; Hardy-Guilbert, 2001; Rougeulle, 1999; Rougeulle, 2003.

Sherd	Site	Sherd	Site
C-1, C-2	S-23	C-192 to C-198	S-4
C-3	S-78	C-199 to C-204	S-26
C-4 to C-13	S-35	C-205 to C-208	S-27
C-14 to C-31	S-43	C-211 to C-214	S-4
C-32 to C-36	S-48	C-215 to C-218	S-5
C-37 to C-47	S-45	C-219	S-11
C-48 to C-65	S-55	C-220	S-14
C-66 to C-70	S-29	C-221	S-16
C-71 to C-84	S-78	C-223, C-224	S-18
C-85 to C-96	S-51	C-225	S-20
C-97 to C-101	S-32	C-226 to C-255	S-5
C-102	S-78	C-256 to C-269	S-7
C-103 to C-106	S-32	C-270 to C-272	S-13
C-108 to C-121	S-56	C-273 to C-278	S-12
C-122	S-60	C-280	S-7
C-123 to C-125	S-36	C-283 to C-303	S-13
C-126	S-50	C-304 to C-306	S-14
C-127 to C-133	S-33	C-307 to C-311	S-15
C-134 to C-138	S-54	C-312 to C-318	S-17
C-139 to C-144	S-64	C-319 to C-323	S-18
C-145 to C-151	S-30	C-324 to C-331	S-23
C-153 to C-165	S-41	C-332 to C-343	S-25
C-166	S-53	C-344 to C-360	S-46
C-168 to C-170	S-61	C-361 to C-371	S-23
C-171 to C-180	S-34	C-372 to C-383	S-84
C-181 to C-187	S-28	C-384 to C-390	S-23
C-188	S-4	C-391 to C-410	S-83
C-189 to C-191	S-77		

Table 4.5: Correspondence table of MHAS ceramic sherds to the sites of their collection.

made. Salmon interior surface. Exterior surface covered with dark brown wash. Lip notched as if to accept a lid. No known comparanda, but presumed to be Late Islamic, because of the exterior treatment. (See Fig. 4.1.)

C-192 Rim sherd of a pear shaped jar. Common ware with grit temper. 32cm rim diameter. Black core, orange toward surfaces. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-97, C-105, C-106, C-199, C-202, C-361, and Sedov 1998, Type 2.0. (See Fig. 4.2.)

C-193 Ring base sherd of an indeterminate vessel type. Common ware with grit temper. 12cm diameter. Black core, light orange toward surfaces. Pre-Islamic. Compare to C-39, C-47, C-72, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.2.)

C-196 Rim sherd of a bowl. Common ware with grit temper. 24cm diameter. Buff ware with light interior surface. Wet smoothed interior. Wheel made. Red paint on rim and exterior. Late Islamic. (See Fig. 4.2.)

C-197 Ring base sherd of an indeterminate vessel type. Common ware with grit temper. 20cm diameter. Black ware. Wheel made. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.2.)

C-198 Ledge rim sherd of a *zīr*. Common ware with chaff and grit temper. 34cm diameter. Pink ware. Wet smoothed interior. Wheel made. Raised horizontal ridge on exterior. Pre-Islamic. Compare to C-1. (See Fig. 4.2.)

C-211 Rim sherd of a large jar. Common ware. No temper visible. 30cm diameter. Soft buff ware. Dark brown slip on interior and exterior. Exterior possibly lightly burnished. Wavy incised line on exterior. Late Islamic. Compare to C-35, C-70, C-218, and Whitcomb 1988, Fig. 13a. (See Fig. 4.2.)

Figure 4.1: Exterior of sherd C-188 from site S-4.

C-212 Rim sherd of a bowl. Common ware with grit temper. 30cm diameter. Buff ware, possibly handmade. Wet-smoothed interior and top 1cm of exterior. Light pink surface where wet smoothed. Pre-Islamic. (See Fig. 4.2.)

C-213 Rim sherd of a bowl. Common ware with grit temper. 16cm diameter. Buff ware, possibly hand made. Burnished interior and exterior. Exterior caked in soot. Pre-Islamic. (See Fig. 4.2.)

C-214 Base and body of a bowl. Common ware with fine grit temper. Diameter indeterminable. Light orange ware. burnished interior and exterior. Notched horizontal ridge on exterior. Late Islamic. Compare to C-95, C-142, C-169, C-225, C-311, and Whitcomb 1988, Figs. 13m and 18l. (See Fig. 4.2.)

4.2.2 S-5 Ceramics

S-5 yielded a variety of utilitarian sherds from the Late Islamic period, and a handful of possible Middle Islamic examples. The preservation of the structure, with its standing walls, argues for a recent date (i.e., within the last two centuries)—and this supposition is supported by the ceramic finds.

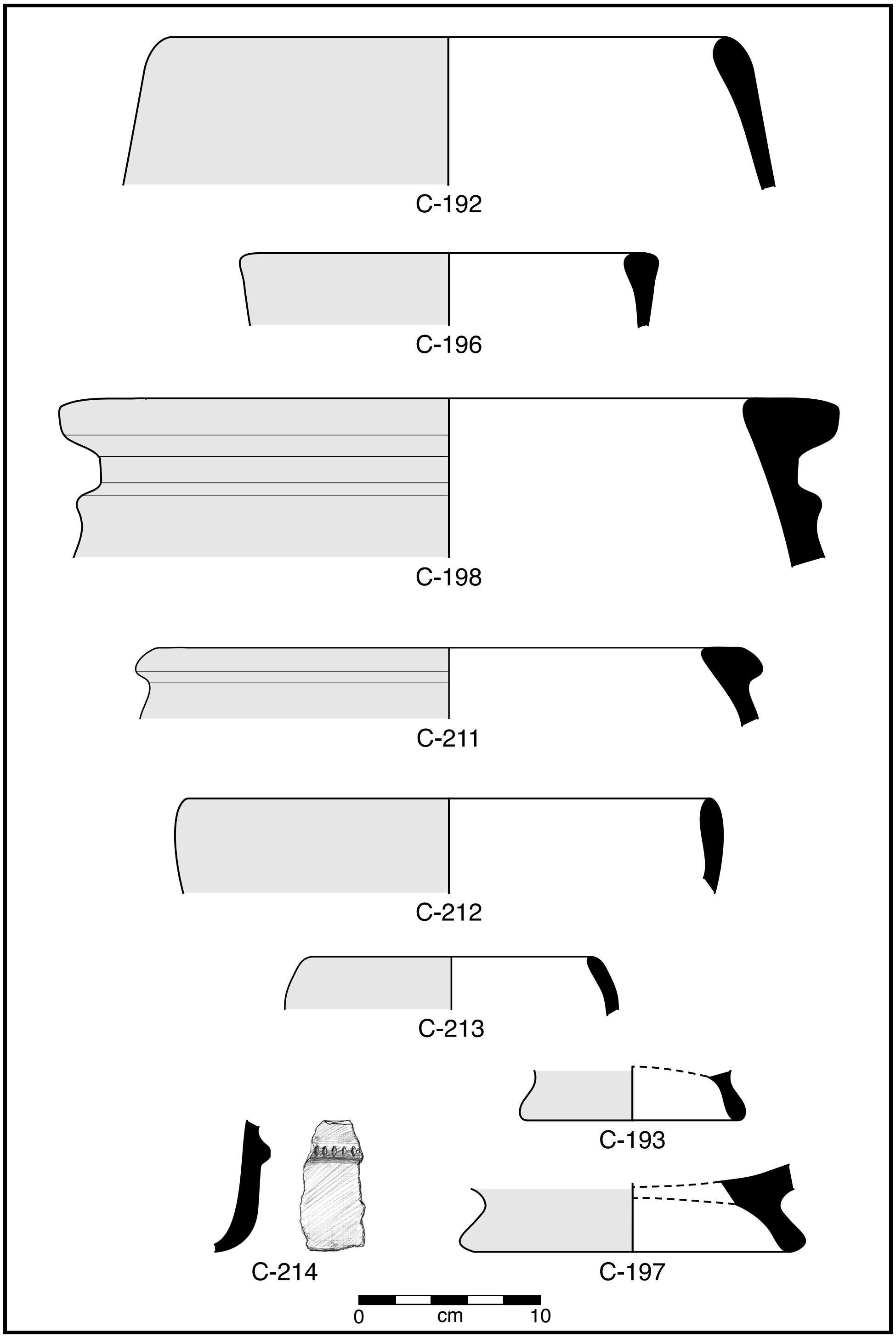

Figure 4.2: Sherds from site S-4.

C-217 Rim sherd of a bowl. Common ware with chaff and grit temper. 22cm diameter. Black core. Buff interior surface. Light pink exterior surface. Probably wheel made. Wet smoothed interior. Red paint on lip, and red painted zig-zag line on exterior. Islamic, probably Middle to Late, judging by the paint. Compare with C-244. (See Fig. 4.3.)

C-218 Rim sherd of a *zīr*. Coarse ware with grit temper. 32cm diameter. Light pink core. Red slip on interior and exterior surfaces. Incised wavy line on exterior. Probably wheel made. Middle to Late Islamic. Compare to C-35, C-70, C-211, and Whitcomb 1988, Figs. 4c and 13a. (See Fig. 4.3.)

C-229 Base sherd of an unknown vessel type (probably a cup). Common ware with grit temper. 8cm diameter at uppermost broken edge. Buff ware. Hand made. Broken edge shows outward turn suggestive of a spout or handle. Brown painted lines and dots on the exterior. Late Islamic. (See Fig. 4.3.)

C-231 Handle and rim of a *miḥmās* coffee roasting pan. Common ware with grit temper. 16cm diameter. Light orange ware. Burnished surfaces. Late Islamic. Compare to C-131, Posey 1994, Cat. 131, and Whitcomb 1988, Figs. 16i and 17j.[12] (See Fig. 4.3.)

C-232 Rim sherd of a Chinese porcelain bowl. 8cm diameter. Blue and White Underglaze painting. Late Islamic. (See Fig. 4.3.)

C-234 Rim sherd of a large jar. Coarse ware with chaff temper. 28cm diameter. Black core, orange toward surfaces. Late Islamic. Compare to C-189, C-220, C-372, and Whitcomb 1988, Fig. 17c. (See Fig. 4.3.)

C-235 Rim sherd of a large jar. Coarse ware with grit temper. 28cm diameter. Buff ware. Probably Islamic, but with an unusual incurved rim and no known comparanda. (See Fig. 4.3.)

C-243 Rim sherd of a small jar. Common ware with chaff and grit temper. 12cm diameter. Black

[12] Though C-231 was measured and drawn with its handle horizontal, it perhaps is better reconstructed (based on the ethnographic examples) with its handle slanted upward.

core, orange toward surfaces. Buff surfaces. Brown paint on rim and exterior. Late Islamic. Compare to Whitcomb 1988, Figs. 17g and 18f. (See Fig. 4.3.)

C-248 Rim sherd of a small jar. Common ware with grit temper. 8cm diameter. Black core, buff toward surfaces. Light orange interior surface. Brown painted floral design on exterior and brown paint on rim. Late Islamic. Compare to C-168, C-268, and C-301. (See Fig. 4.3.)

C-250 Neck sherd of a bottle. Common ware with grit temper. 5cm diameter. Bottom edge of sherd shows where this piece was joined to the vessel body. Buff ware. Black painted net design on exterior. Joint for handle on sherd wall. Late Islamic. (See Fig. 4.3.)

4.2.3 S-7 Ceramics

As with site S-5's ceramics, datable sherds collected at this site are Late Islamic in date. And, as with the structure at S-5, the fortress at S-7 is well-preserved, indicating a relatively recent abandonment.

C-256 Rim sherd of a *zīr*. Coarse ware with chaff and grit temper. 36cm diameter. Light orange ware. Late Islamic. Compare to Whitcomb 1988, Fig. 16a. (See Fig. 4.4.)

C-257 Rim sherd of a bowl. Common ware with grit temper. 14cm diameter. Orange ware. Wheel made. Presumably Late Islamic, based on other sherds and architecture at this site. (See Fig. 4.4.)

C-261 Rim sherd of a large jar. Common ware with grit temper. Rim diameter indeterminate, but probably in excess of 30cm. Light pink ware. Presumably Late Islamic, based on other sherds and architecture at this site. (See Fig. 4.4.)

C-262 Rim sherd of a jar. Common ware with chaff and grit temper. 20cm diameter. Light pink ware. Wet smoothed interior and exterior. Presumably Late Islamic, based on other sherds and architecture at this site. (See Fig. 4.4.)

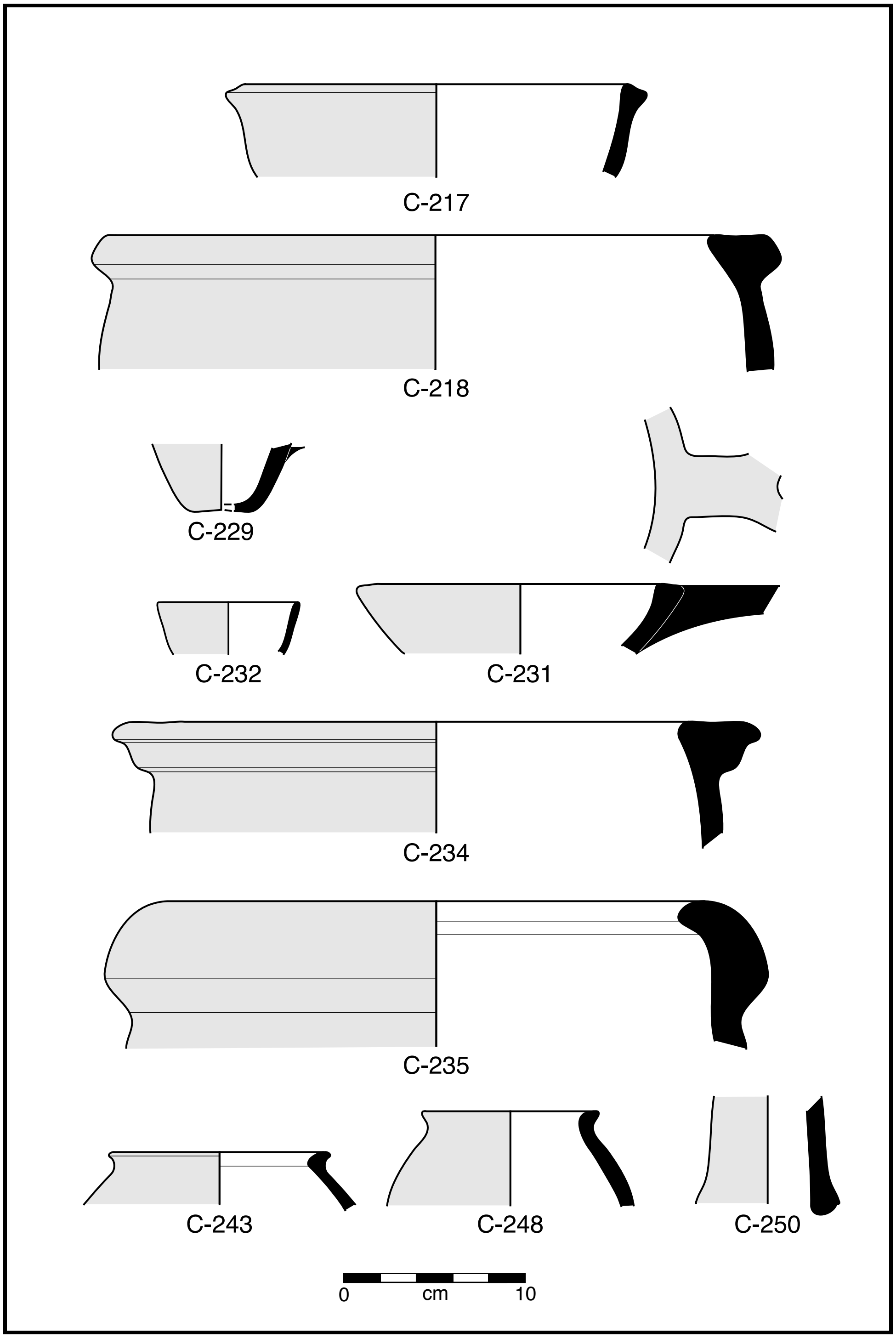

Figure 4.3: Sherds from site S-5.

C-263 Rim sherd of a bowl. Common ware with chaff and grit temper. 18cm diameter. Light orange ware. Wet smoothed interior and exterior. Presumably Late Islamic, based on other sherds and architecture at this site. (See Fig. 4.4.)

C-265 Rim sherd of a *zīr*. Coarse ware with grit temper. Rim diameter indeterminate, but probably in excess of 35cm. Buff ware. Incised wavy band on exterior. Presumably Late Islamic, based on other sherds and architecture at this site. No known comparanda, but distinctive exteriorly thickened rim, apparently to take a lid. (See Fig. 4.4.)

C-266 Rim sherd of a small bowl. Common ware with grit temper. 14cm diameter. Buff ware. Hand made. Combed straight and wavy bands on exterior. Possibly Early Islamic, based on the combed decoration. (See Fig. 4.4.)

C-267 Rim sherd of a small jar. Common ware with grit temper. 10cm diameter. Black core, light orange toward surfaces. Probably wheel made. Brown painted floral design on exterior. Late Islamic. Compare to C-64 and C-339. (See Fig. 4.4.)

C-268 Rim sherd of a small jar. Common ware with grit temper. 8cm diameter. Black core, buff toward surfaces. Wet smoothed interior and exterior. Brown painted floral design on exterior and brown paint on rim. Late Islamic. Compare to C-168, C-248, and C-301. (See Fig. 4.4.)

C-269 Handle and rim of a bowl. Common ware with chaff and grit temper. 12cm diameter. Black core, light pink toward surfaces. Brown painted horizontal lines, dots, and crosshatched triangles on exterior. Handle pierced from top while clay was still wet. Wheel made. Late Islamic. (See Fig. 4.4.)

4.2.4 S-11 Ceramics

Site S-11 represents only a very ephemeral human presence, and the single sherd collected here cannot be definitively associated with the site's other features. At best, the ceramic evidence from here indicates some undefined use of the site, probably during the Late Islamic period.

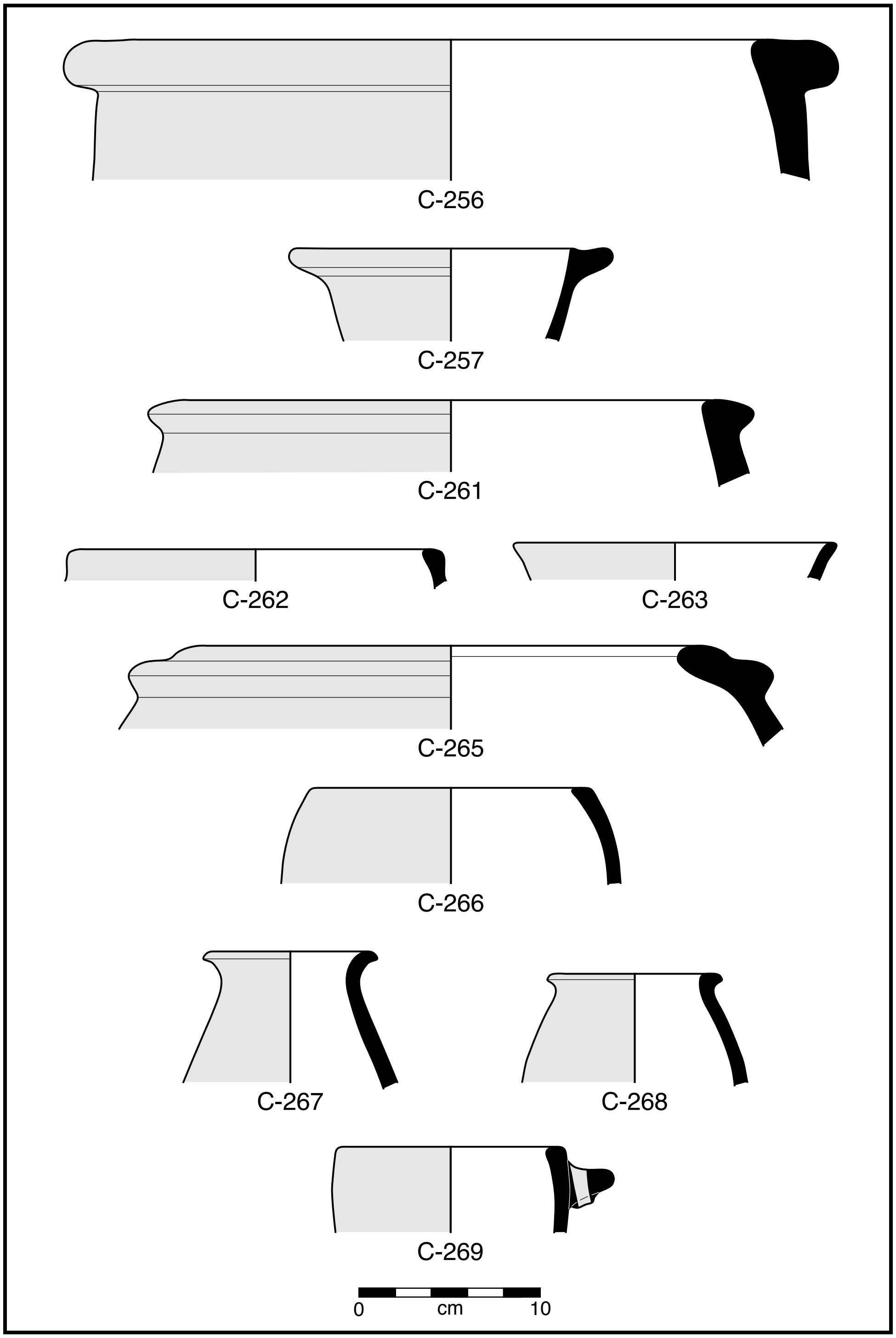

Figure 4.4: Sherds from site S-7.

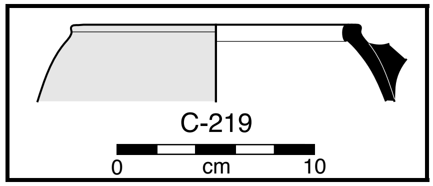

Figure 4.5: Sherd C-219 from site S-11.

C-219 Rim sherd and part of a handle of a small jar. Common ware with grit temper. 14cm diameter. Possibly hand made. Orange ware. Wet-smoothed exterior, with black painted stripes. Probably Late Islamic, based on the painting. (See Fig. 4.5.)

4.2.5 S-12 Ceramics

Site S-12, badly damaged and adjacent to the main Wādī Ḥaḍramūt trunk road yielded poor ceramic data. Datable sherds are clearly Islamic (definitely Late Islamic, and probably also Middle Islamic) utilitarian wares, but cannot be definitively correlated with the site, as opposed to intrusions from other activity in the area.

C-273 Two joining thin-walled flat base sherds of an unknown vessel type. Common ware with grit temper. 18cm diameter at point of inflection where base joins with wall. Black core, pink toward outer surface. Exterior may be lightly burnished. Late Islamic. Compare to C-374 and Whitcomb 1988, Fig. 13n. (See Fig. 4.6.)

C-274 Rim sherd of a small unknown vessel type. Common ware with grit temper. 8cm diameter. Black ware. Burnished exterior and upper portion of interior. Incised bands on exterior, with rows of impressed dots between them. Probably Late Islamic. (See Fig. 4.6.)

C-275 Body sherd of a Chinese porcelain bowl. Blue and White Underglaze painting on exterior and interior. Late Islamic. (See Fig. 4.7.)

C-276 Body sherd of an unknown vessel type. Common ware with grit temper. Light pink core, light orange exterior surface. Red and brown painted lines on exterior. Possibly from the same vessel as C-278. Middle to Late Islamic. (See Fig. 4.7.)

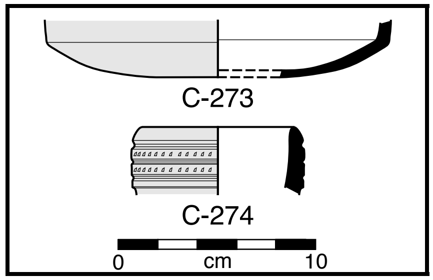

Figure 4.6: Sherds from site S-12.

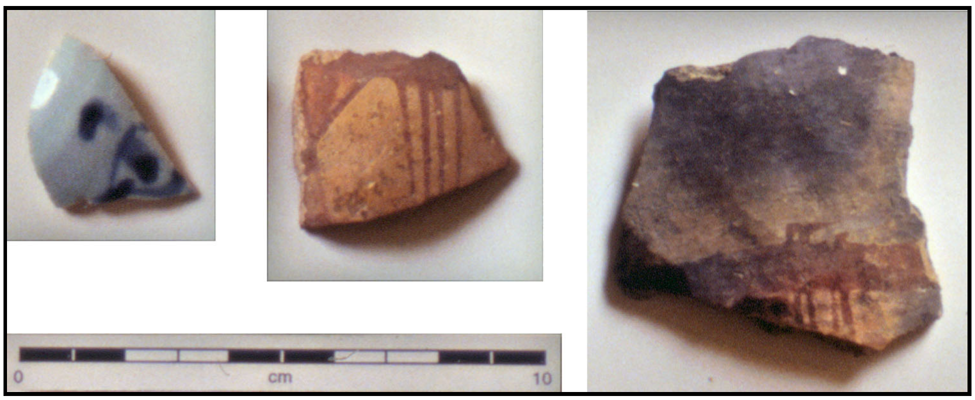

Figure 4.7: Sherds from S-12. *L to R*: C-275, C-276, C-278.

C-278 Body sherd of an unknown vessel type. Common ware with grit temper. Black core, light orange exterior (fire clouded). Exterior burnished and painted with red and brown lines. Hand made. Possibly from the same vessel as C-276. Middle to Late Islamic. (See Fig. 4.7.)

4.2.6 S-13 Ceramics

S-13, a large sprawling site near Šibām—perhaps representing multiple periods—yielded the greatest single collection of ceramics in the MHAS survey. Most of the collected sherds remain unanalyzed, however. (See n. 2, above.) Most of these sherds are Late Islamic in date, though a number of them are potentially Middle Islamic. A few of the simpler forms are also possibly Pre-Islamic in date, but cannot be positively identified as such. The wide variety of sherd types found at S-13, nevertheless, are consistent with what one would expect from a town site.

C-270 Body sherd and partial handle of a vessel of unknown type (but probably a jar or a bottle). Common ware with chaff and grit temper. 18cm diameter at outermost edge of sherd, a fairly sharp point of inflection. Black core, buff toward exterior, and light pink toward the interior. Brown painted bands on exterior. Middle to Late Islamic. (See Fig. 4.8.)

C-271 Neck sherd of a bottle. Common ware with grit temper. Black ware with brown exterior surface. Hand made Raised horizontal ridge on exterior. Dark brown paint on exterior. Middle to Late Islamic. (See Fig. 4.9.)

C-290 Whole profile of a shallow bowl. Common ware with grit temper. 18cm diameter. Brown ware. Possibly burnished exterior. Hand made. No comparanda for this vessel—so its date is, unfortunately, unknown. (See Fig. 4.8.)

C-294 Knob handle of a lid. Coarse ware with chaff temper. 5.5cm diameter at outer edge of knob. Buff ware. Probably Late Islamic. Compare to C-120, C-292, and Whitcomb 1988, Fig. 17p. (See Fig. 4.8.)

C-297 Body sherd of a vessel of unknown type. Common ware with grit temper. Black core, orange toward outer surface. Buff interior. Orange exterior. Wheel made. Notched horizontal ridge on exterior. Brown painted lines on exterior, paralleling and crossing the ridge. Middle to Late Islamic. (See Fig. 4.9.)

C-299 Whole profile sherd of a pipe bowl. Common ware with grit temper. 6cm diameter at rim. Black core, red toward surfaces. Rows of impressed dots and triangles on the exterior. Probably Late Islamic. (See Fig. 4.8.)

C-300 Rim sherd of a small bowl. Common ware with grit temper. 10cm diameter. Buff ware. Wet smoothed interior. Wheel made. Brown painted net design on exterior, and brown paint on lip. Late Islamic. (See Fig. 4.8.)

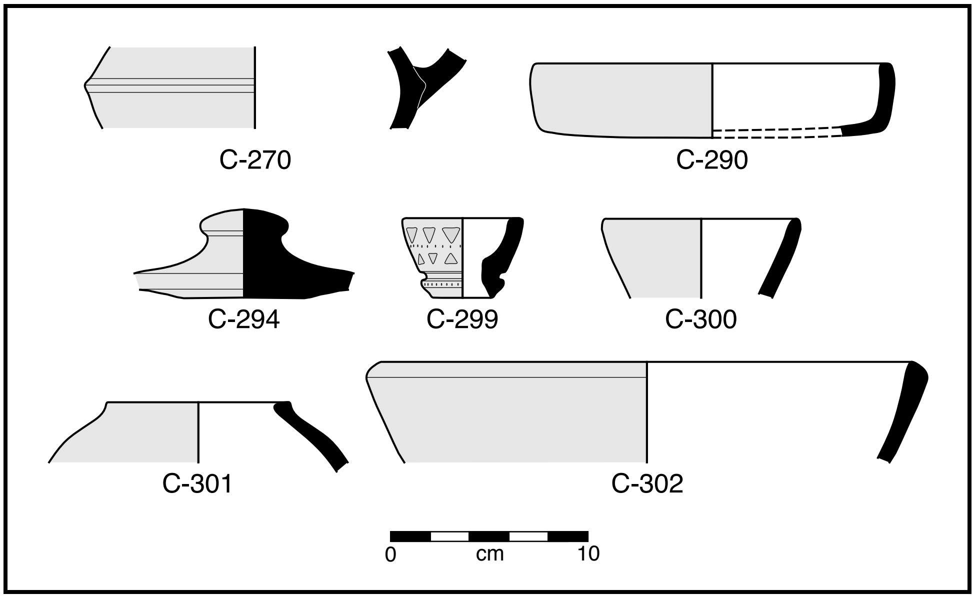

Figure 4.8: Sherds from site S-13..

C-301 Rim sherd of a small jar. Common ware with grit temper. 8cm diameter. Black core, light orange toward surfaces. Wet smoothed interior. Black paint on lip and black painted vegetal design on exterior. Late Islamic. Compare to C-168, C-248, and C-268. (See Fig. 4.8.)

C-302 Rim sherd of a bowl. Common ware with chaff temper. 28cm diameter. Black core, orange toward exterior, buff toward interior. Wheel made. Brown paint on the rim and exterior, but in bad condition, so the design is hard to see. Definitely Islamic, because of the paint, and probably Middle to Late. (See Fig. 4.8.)

C-303 Base sherd of a Chinese porcelain bowl. Blue and White Underglaze porcelain, painted on the interior and exterior. Foot broken off. (See Fig. 4.9.)

4.2.7 S-14 Ceramics

Site S-14, near S-13 and with similar architecture, yields similar ceramics—mostly Islamic in date.

C-220 Rim sherd of a *zīr*. Coarse ware with chaff and grit temper. 38cm diameter. Buff ware.

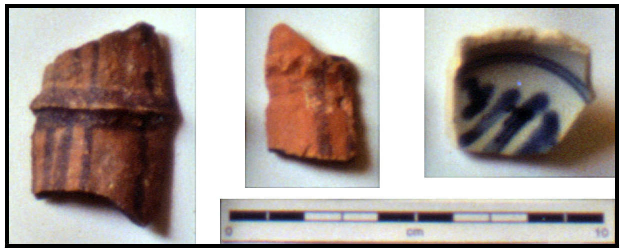

Figure 4.9: Sherds from S-13. *L to R*: C-271, C-297, C-303.

Traces of brown slip on exterior. Wheel made. Two lightly incised wavy lines on the exterior. Probably Late Islamic. Compare to C-189, C-234, and C-372. (See Fig. 4.10.)

C-304 Rim sherd of a large jar. Common ware with chaff and grit temper. 18cm diameter. Black core, buff toward surfaces. Wheel made. Probably Islamic. (See Fig. 4.10.)

C-305 Base sherd of a vessel of unknown type. Common ware with chaff and grit temper. 18cm diameter at outer edge of flat base, where it turns to the vessel walls. Black core, light orange toward exterior, buff toward interior. Wheel made. Probably Islamic. (See Fig. 4.10.)

C-306 Rim sherd of a bowl. Coarse buff ware with chaff temper. 24cm diameter. Wet smoothed interior. Wheel made. Date indeterminate (could be either Pre-Islamic or Islamic). (See Fig. 4.10.)

4.2.8 S-15 Ceramics

Site S-15 yielded very little ceramic data. Most of the sherds are Islamic in date, but one base sherd (C-308) is clearly Pre-Islamic. The apparent antiquity of the site's architecture argues for an earlier date for the site, and suggests that the Islamic sherds are later contaminants from nearby Islamic period fields and settlements. Overall, however, the available data—ceramic and architectural—is insufficient for solid dating of the site or estimating its principal function.

C-307 Two joining rim sherds of a large jar. Common ware with chaff and grit temper. 24cm diameter. Light pink ware. Brown slip on interior and rim. Probably Late Islamic. Compare to C-32, C-58, C-85, C-309, and C-310. (See Fig. 4.11.)

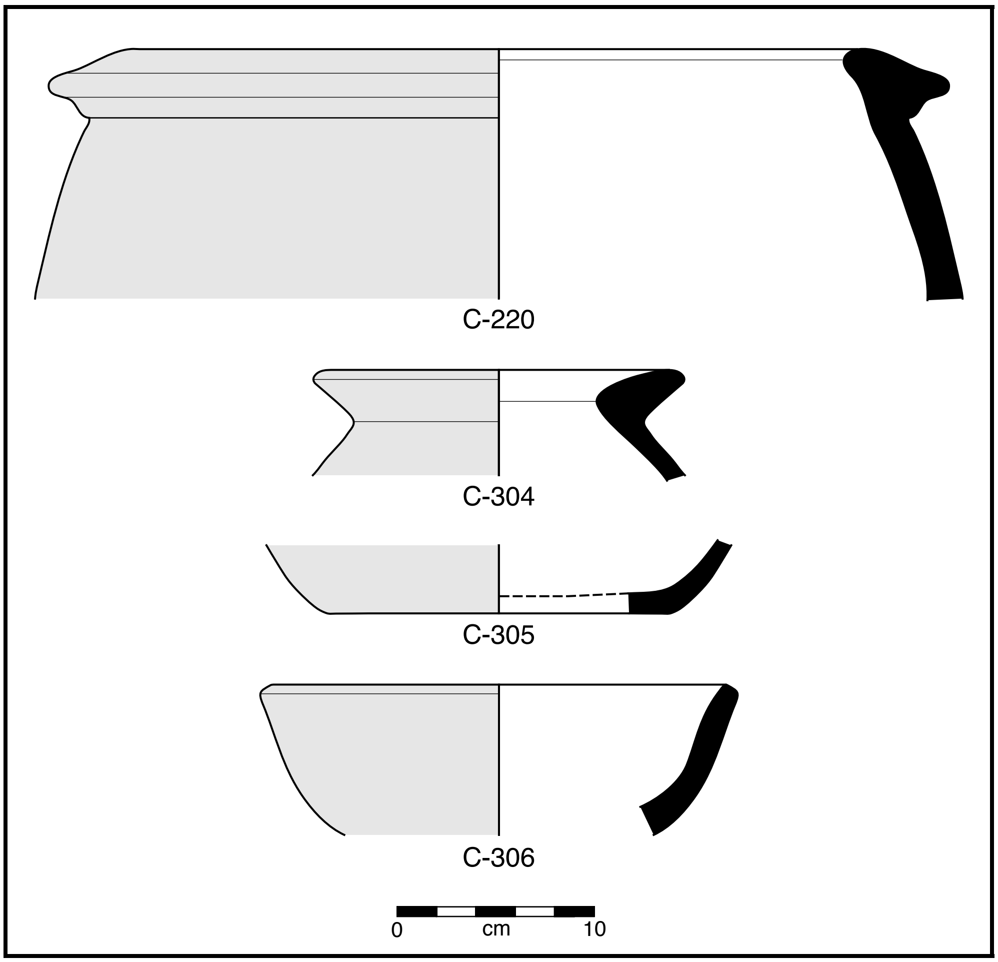

Figure 4.10: Sherds from site S-14.

C-308 Tall ring base sherd from a vessel of unknown type. Common ware with chaff temper. 24cm diameter at outermost (broken) edge. Light pink ware. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-197, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.11.)

C-309 Rim sherd of a large jar. Common ware with chaff and grit temper. 26cm diameter. Light orange ware. Brown slip on interior and exterior. Lightly incised wavy line on exterior. Wheel made. Probably Late Islamic. Compare to C-32, C-58, C-85, C-307, and C-310. (See Fig. 4.11.)

C-310 Body sherd, very near the rim, of a large jar. Common ware with chaff and grit temper. 32cm diameter at outermost edge. Light pink ware. Brown slip on exterior. Wheel made. Lightly incised wavy band on exterior. Probably Late Islamic, based on the brown slip. Compare to C-32, C-58, C-85, C-307, and C-309. (See Fig. 4.11.)

C-311 Body and handle of a bowl. Common ware with grit temper. Diameter indeterminable. Black core, orange toward surfaces. Wet smoothed interior. Rectangular lug handle and notched horizontal ridge on exterior. Late Islamic. Compare to C-95, C-142, C-169, C-214, and C-225. (See Fig. 4.11.)

4.2.9 S-16 Ceramics

Only two small sherds were collected at S-16. Though they are probably Late Islamic in date, their usefulness in determining the site's function or age is minimal. (C-222, being a body sherd, is not discussed below.)

C-221 Base sherd of a vessel of unknown type. Stoneware with grit temper. 20cm diameter at outer edge of flat base. Very dense and heavy with black temper. Exterior burnished. Probably Late Islamic. (See Fig. 4.12.)

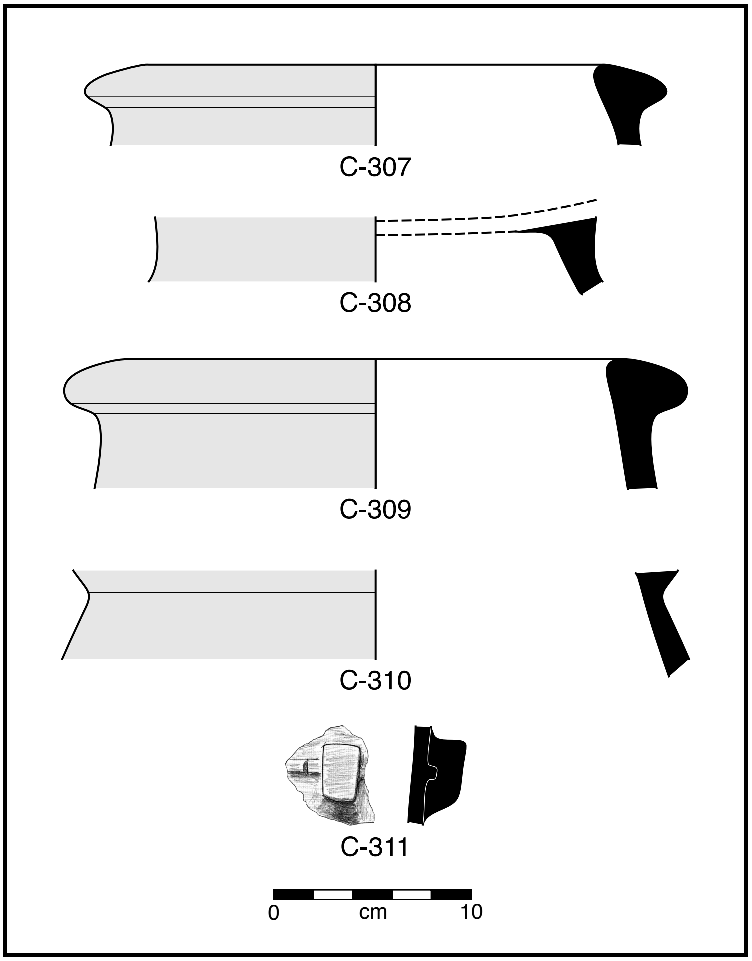

Figure 4.11: Sherds from site S-15.

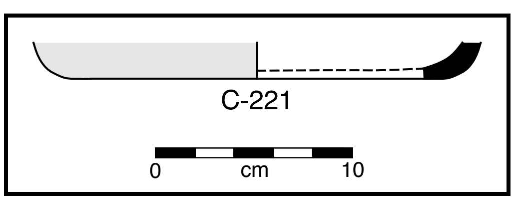

Figure 4.12: Sherd C-221 from site S-16.

4.2.10 S-17 Ceramics

The ceramic data from S-17, though sparse, support the supposition that this site is Pre-Islamic in date. Though not all sherds from here are clearly datable, those that are are clearly and unambiguously Pre-Islamic. They, however, do not give any additional clues as to the site's function.

C-312 Rim sherd of a bowl. Common ware with no temper visible. 16cm diameter. Light pink ware. Wheel made. Periodization unknown (could be either Pre-Islamic or Islamic). (See Fig. 4.13.)

C-313 Rim sherd of a bowl. Common ware with chaff and grit temper. 22cm diameter. Black core, light orange towards surfaces. Wheel made. Possibly Pre-Islamic. (See Fig. 4.13.)

C-314 Rim sherd of a bowl. Stoneware with grit temper. 24cm diameter. Brown ware. Wheel made. Possibly Pre-Islamic. Compare to C-315. (See Fig. 4.13.)

C-315 Rim sherd of a bowl. Stoneware with grit temper. 22cm diameter. Black ware. Wheel made. Possibly Pre-Islamic. Compare to C-314. (See Fig. 4.13.)

C-316 Rim sherd of a bowl. Common ware with grit temper. 18cm diameter. Buff ware. Light pink exterior surface. Wet smoothed interior and exterior surfaces. Wheel made. Possibly Pre-Islamic. (See Fig. 4.13.)

C-317 Ring base sherd from a vessel of unknown type. Common ware with grit temper. 10cm diameter. Black core, brown toward surfaces. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-197, C-308, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.13.)

C-318 Ring base sherd from a vessel of unknown type. Common ware with grit temper. 12cm diameter. Black core, orange toward surfaces. Wheel made. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-197, C-308, C-317, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.13.)

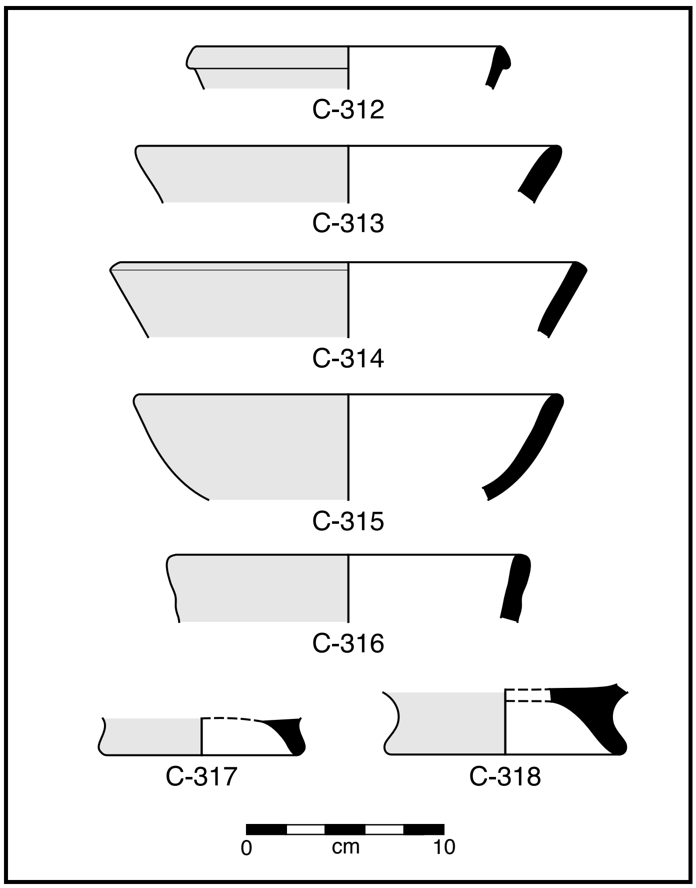

Figure 4.13: Sherds from site S-17.

4.2.11 S-18 Ceramics

S-18, a small village with modern intrusions, possibly built atop the remains of an earlier settlement, yields poor ceramic data. Datable sherds are unambiguously Late Islamic, but a few sherds are unique, having no known comparanda, and are therefore undatable. Most likely, the ceramics collected suggest that the site has had multiple uses, unrelated temporally or functionally.

C-223 Rim sherd of a large jar. Common ware with chaff temper. 28cm diameter. Pattern of horizontal ridges on the exterior of its thickened rim give it a "screw top" appearance. Buff ware. Wheel made. Perhaps Early Islamic, judging by the fabric. Compare to Rougeulle 2001, Fig. 3.15 and Whitcomb 1988, Fig. 1d. (See Fig. 4.14.)

C-224 Rim sherd of a jar. Coarse ware with chaff and grit temper. 22cm diameter. Buff ware. Wheel made. Red slip on exterior. Notched horizontal ridge on exterior. Probably Pre-Islamic. Compare to C-2. (See Fig. 4.14.)

C-319 Rim sherd of a bowl. Stoneware with grit temper. 18cm diameter. Brown core, black toward exterior. Burnished interior and exterior surfaces. Wheel made. May be from the same vessel as C-320. Late Islamic. Compare to Whitcomb 1988, Fig. 18b. (See Fig. 4.14.)

C-321 Rim sherd of a bowl. Common ware with chaff temper. 24cm diameter. Buff ware. Perhaps traces of pink slip on interior. Wheel made. Probably Islamic. (See Fig. 4.14.)

C-322 Rim sherd of a large jar. Common ware with grit temper. 32cm diameter. Light pink ware. Wet smoothed interior. Possible traces of red slip on the rim. Wheel made. Probably Islamic. (See Fig. 4.14.)

C-323 Body sherd of a Chinese porcelain bowl. Blue and White Underglaze painting on exterior. Late Islamic. Compare crosshatched painting to that of C-150 and swirl to that of C-336. (See Fig. 4.14.)

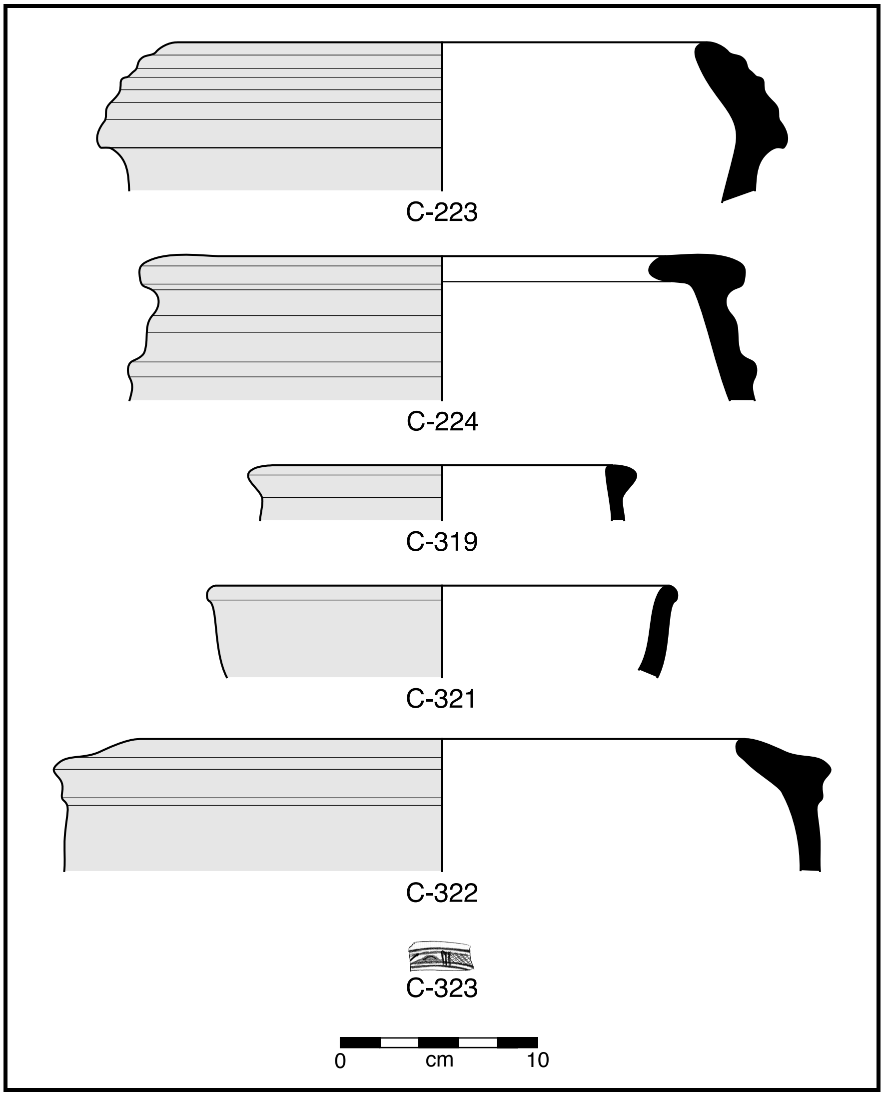

Figure 4.14: Sherds from site S-18.

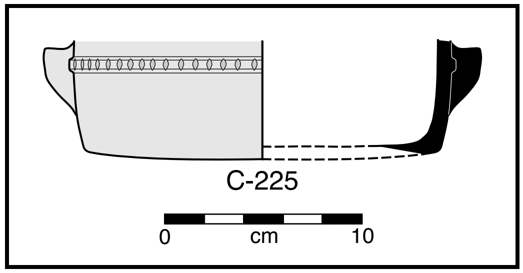

Figure 4.15: Sherd C-225 from site S-20.

4.2.12 S-20 Ceramics

Collections at S-20 were cut short by injury, and so cannot be taken as exemplary of the density of ceramics at the site. The single sherd analyzed is Late Islamic in date, as would be expected by the site's standing architecture.

C-225 Base, body, and handle of a bowl. Common ware with grit temper. 20cm diameter at handle. Black core, pink toward interior, red toward exterior. Possibly wheel made. Burnished exterior. Rectangular lug handle and notched horizontal ridge on exterior. Late Islamic. Compare to C-95, C-142, C-169, C-214, and C-311. (See Fig. 4.15.)

4.2.13 S-23 Ceramics

The site of S-23, though recently plowed to make room for a field (which, apparently, was never planted), has perhaps the highest density of surface sherds of any site in the MHAS study area. Sherds collected here are uniformly Pre-Islamic in date, and very comparable to those from Jūjah (S-24) and Raybūn. Of particular note are the inscribed *zīr* sherds found inside the remains of a building's foundations in the southeast corner of the site.

C-1 Rim sherd of a *zīr*. Coarse ware with chaff and grit temper. 37cm diameter. Incised Musnad characters (I-17) on flat upper surface of rim. Black core, light orange surfaces. Horizontal ridge on exterior. Wheel made. Pre-Islamic (Jūjah Level III). Compare to C-2 and Sedov 1995a, Fig. 6.9 (which, however, lack the horizontal ridge). (See Fig. 4.16.)

C-2 Rim sherd of a *zīr*. Common ware with grit temper. 32cm diameter at inner edge of rim. Two joining sherds. Incised Musnad characters (I-18) on flat upper surface of rim. Very dense fabric (nearly stoneware). Black core, red surfaces. Diagonally notched horizontal ridge on exterior. Incised wavy band above ridge. Wheel made. Pre-Islamic (Jūjah Level III). Compare to C-1 and Sedov 1995a, Fig. 6.9. (See Fig. 4.16.)

C-324 Rim sherd of a hole mouth jar. Common ware with grit temper. 14cm diameter. Light pink ware. Possibly wheel made. Pre-Islamic (Jūjah Levels IV to III). Compare to C-40, C-75, C-80, C-205, C-330, C-364, C-366, and Hansen *et al.* 2004, Figs. 27.1–4 and 31.1–8. (See Fig. 4.17.)

C-325 Rim sherd of a bowl. Common ware with grit temper. 28cm diameter. Buff ware. Red slip on exterior. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-8, C-102, C-201, C-203, C-206, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.17.)

C-328 Rim sherd of a bowl. Common ware with grit temper. 22cm diameter. Black core, pink toward surfaces. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-8, C-102, C-201, C-203, C-206, C-325, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.17.)

C-329 Rim sherd of a deep bowl. Common ware with grit temper. 18cm diameter. Black core, red toward interior. Wet smoothed interior. Wheel made. Pre-Islamic (Raybūn MR-I to MR-II). Compare to Sedov 1998, Type 2.1 (MR-I to MR-II). (See Fig. 4.17.)

C-330 Rim sherd of a hole mouth jar. Common ware with chaff and grit temper. 16cm diameter. Black core, brown toward exterior. Lightly incised wavy band on exterior. Wheel made. Pre-Islamic (Jūjah Levels IV to III). Compare to C-40, C-75, C-80, C-205, C-324, C-364, C-366, and Hansen *et al.* 2004, Figs. 27.1–4 and 31.1–8. (See Fig. 4.17.)

C-331 Ring base sherd of a vessel of unknown type. Common ware with grit temper. 8.5cm diameter. Black ware. Wheel made. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-

197, C-308, C-317, C-318, C-327, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.17.)

C-363 Rim sherd of a bowl. Common ware with chaff and grit temper. Diameter indeterminable. Black core, maroon interior, and orange exterior. Wheel made. Incised horizontal line on exterior, just below lip. Pre-Islamic (Jūjah Level V). Compare to C-83 and Hansen *et al.* 2004, Figs. 23.8, 23.9, 23.11, 23.12, 24.4, 24.6, and 24.7. (See Fig. 4.17.)

C-371 Rim sherd of a jar. Common ware with chaff and grit temper. 20cm diameter. Black core, orange exterior. Incised horizontal line on exterior, just below lip, with incised wavy line below that. Probably wheel made. Pre-Islamic (Raybūn LR-I). Compare to C-37, C-195, C-326, C-350, C-351, C-368, and Sedov 1998, Type 2.1 (LR-I). (See Fig. 4.17.)

4.2.14 S-25 Ceramics

The sherds collected on site S-25 are generally Late Islamic, though some may be earlier. Their usefulness for determining the site's chronology, however, is somewhat limited because of possible contamination from nearby modern fields and a heavily traveled dirt road.

C-332 Rim sherd of a small bowl. Common ware with grit temper. 14cm diameter. Black core, buff toward surfaces. Interior and exterior wet smoothed. Probably hand made. Brown paint on exterior and rim. Late Islamic. (See Fig. 4.18.)

C-333 Rim sherd of a jar. Common ware with grit temper. 14cm diameter. Red ware. Wet smoothed interior and exterior. Wheel made. Probably Islamic, based on other ceramics found at this site. (See Fig. 4.18.)

C-335 Body and handle of a jar. Common ware with chaff temper. 24cm diameter at outer edge of handle. Black core, orange toward surfaces. Interior and exterior burnished. Ledge handle. Late Islamic. Compare to Whitcomb 1988, Fig. 18c. (See Fig. 4.18.)

C-336 Body sherd of a Chinese porcelain bowl. Blue and White Underglaze painted. Late Islamic. Compare swirl to that of C-323. (See Fig. 4.19.)

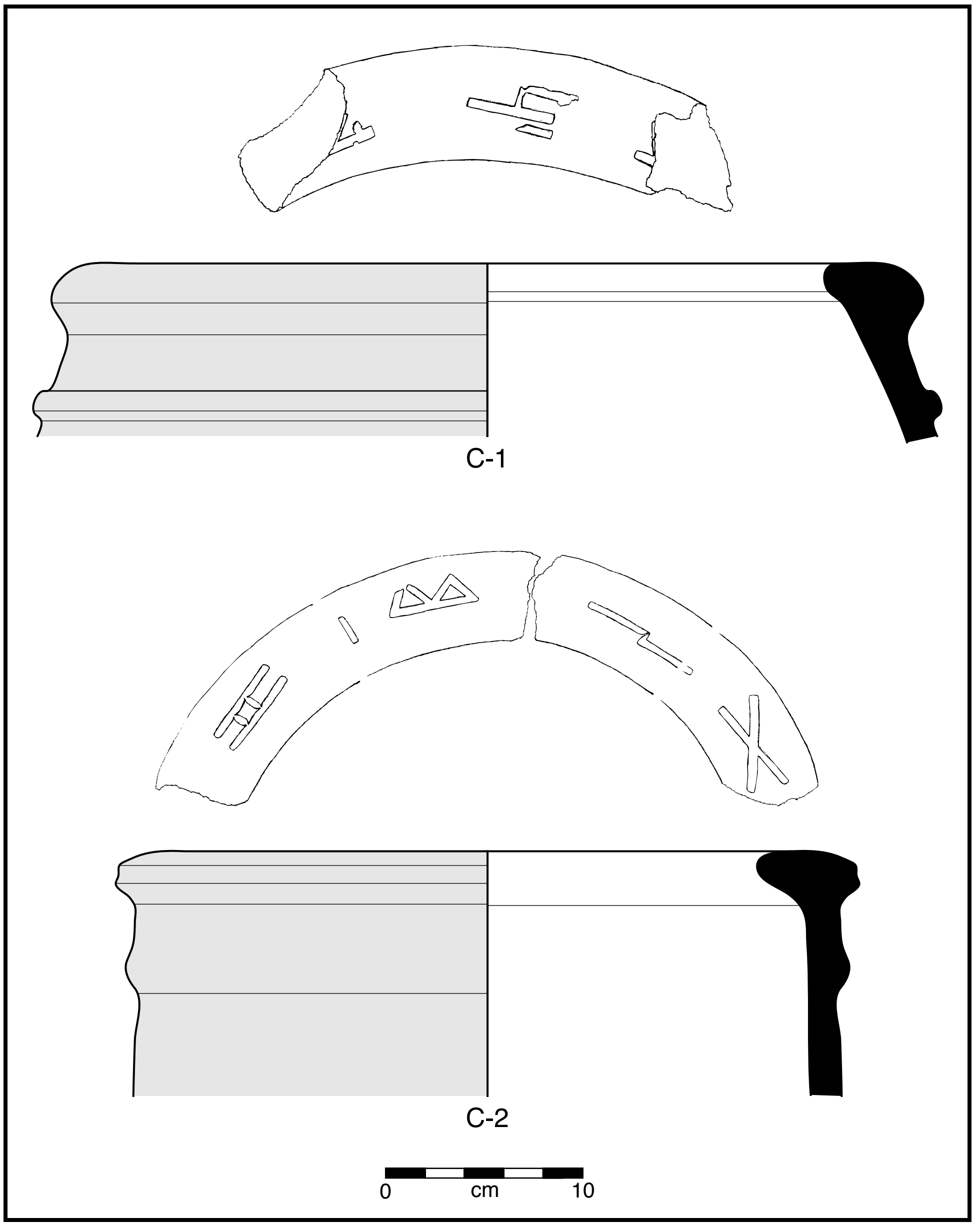

Figure 4.16: Inscribed ceramics from site S-23. C-1 (*top*) carries inscription I-17, which reads [𐩵]𐩢𐩵 (D Ḥ [D]). C-2 (*bottom*) carries inscription I-18, which reads 𐩹𐩣𐩬|𐩩 (Ḏ M N T).

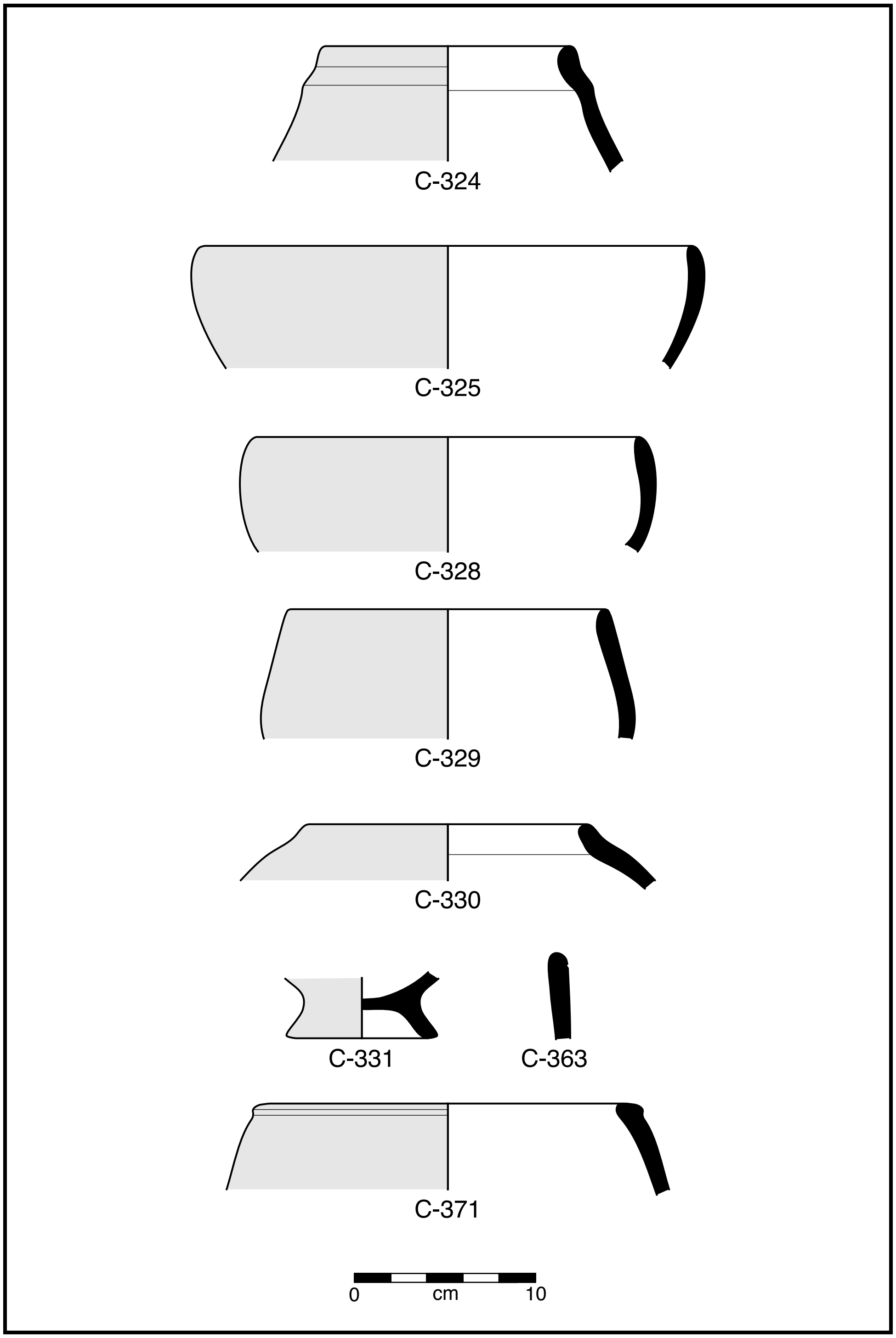

Figure 4.17: Sherds from site S-23.

C-339 Rim sherd of a small jar. Common ware with grit temper. 10cm diameter. Black core, light orange toward surfaces. Wet smoothed interior and exterior. Reddish brown paint on rim and exterior. Wheel made. Late Islamic. Compare to C-64 and C-267. (See Fig. 4.18.)

C-341 Body sherd of a Chinese porcelain bowl. Blue and White Underglaze painting. "Chrysanthemum" design.[13] Late Islamic (a similar sherd is identified by Whitcomb as belonging to the 19th century).[14] Compare to C-19, C-342, Hardy-Guilbert and Rougeulle 1997, Fig. 5.9, and Whitcomb 1988, Figs. 22b and 23w. (See Fig. 4.19.)

C-342 Body sherd of a Chinese porcelain bowl. Blue and White Underglaze painting. "Chrysanthemum" design. Late Islamic, possibly 19th century, see above. Compare to C-19, C-342, Whitcomb 1988, Figs. 22b and 23w , and Hardy-Guilbert and Rougeulle 1997, Fig. 5.9. (See Fig. 4.19.)

4.2.15 S-26 Ceramics

Though the function of site S-26 is somewhat enigmatic, its architecture is firmly Pre-Islamic—an assignation that is bolstered by the (admittedly few) ceramics collected there. The sherds collected are plain and utilitarian, but all with good analogues at Jūjah and Raybūn.

C-199 Rim sherd of a large jar. Common ware with chaff temper. 36cm diameter. Black core, orange toward surfaces. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-97, C-105, C-106, C-192, C-202, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.20.)

C-200 Rim sherd of a large bowl. Common ware with chaff temper. 34cm diameter. Black core, pink toward surfaces. Wheel made. Pre-Islamic (Jūjah Level IV). Compare to Hansen *et al.* 2004, Fig. 27.5. (See Fig. 4.20.)

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[13] Hardy-Guilbert and Rougeulle, 1997, p. 137, label this design a chrysanthemum, but because of the pointed petals, it seems more likely that this is representative of a lotus flower.

[14] Whitcomb, 1988, p. 202.

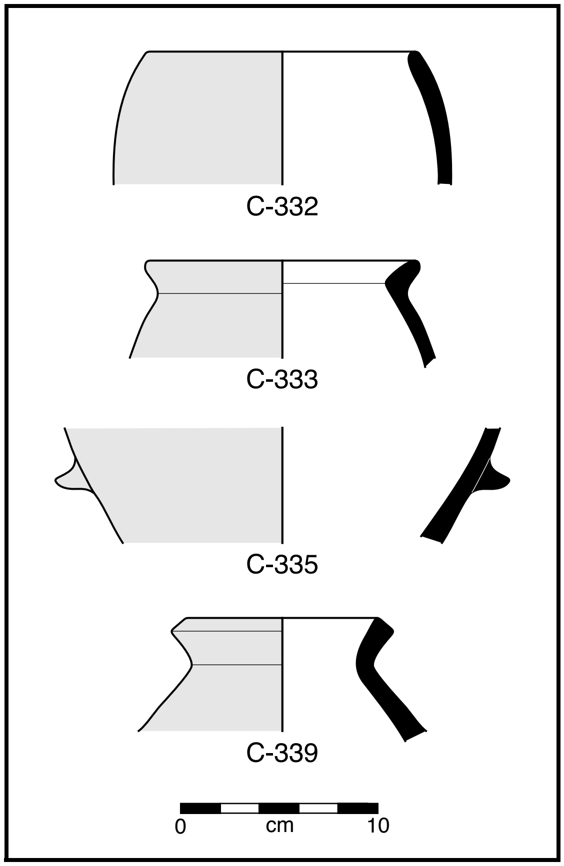

Figure 4.18: Sherds from site S-25. *T to B*: C-332, C-333, C-335, C-339.

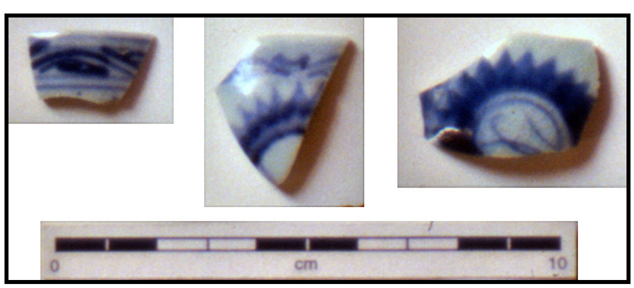

Figure 4.19: Sherds from S-25. *L to R*: C-336, C-341, C-342.

C-201 Rim sherd of a bowl. Common ware with chaff and grit temper. 24cm diameter. Black core, light orange toward surfaces. Wheel made. Interior burnished. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-8, C-102, C-203, C-206, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.20.)

C-202 Rim sherd of a hole mouth jar. Common ware with grit temper. 22cm diameter. Black core, orange toward surfaces. Wet smoothed interior and exterior. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-97, C-105, C-106, C-192, C-199, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.20.)

C-203 Rim sherd of a bowl. Common ware with chaff and grit temper. 14cm diameter. Black core, orange toward surfaces. Wet smoothed interior and exterior. Wheel made. Pre-Islamic (Jūjah Levels IV to I). C-5, C-8, C-102, C-201, C-206, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.20.)

C-204 Rim sherd of a large bowl. Coarse ware with grit temper. 38cm diameter. Brown core. Lightly incised wavy band on exterior. Pre-Islamic (Jūjah Level III). Compare to Hansen *et al.* 2004, Fig. 28.3. (See Fig. 4.20.)

4.2.16 S-27 Ceramics

This site was discovered and identified as a Pre-Islamic site during the 1994 season of the Jūjah excavations.[15] At that time, it was judged to be Pre-Islamic by a cursory examination of the visible architecture. The sherds collected by MHAS confirm this earlier assessment of the site's age.

C-205 Rim sherd of a hole mouth jar. Common ware with grit temper. 12cm diameter. Black core, pink toward interior, and orange toward exterior. Probably wheel made. Pre-Islamic (Jūjah Levels IV to III). Compare to C-40, C-75, C-80, C-324, C-330, C-364, C-366, and Hansen *et al.* 2004, Figs. 27.1–4 and 31.1–8. (See Fig. 4.21.)

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[15] Hansen, 1994, p. 10.

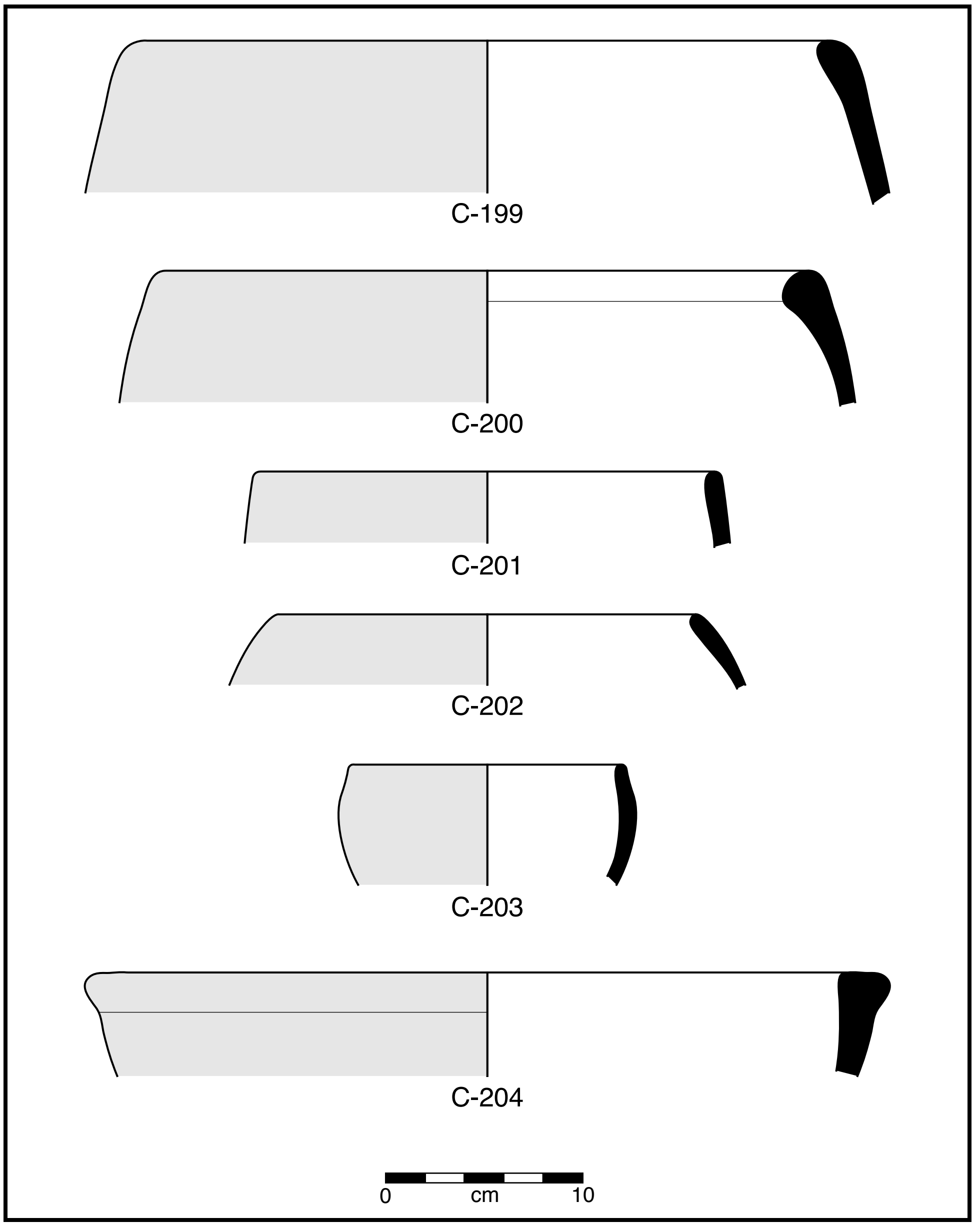

Figure 4.20: Sherds from site S-26.

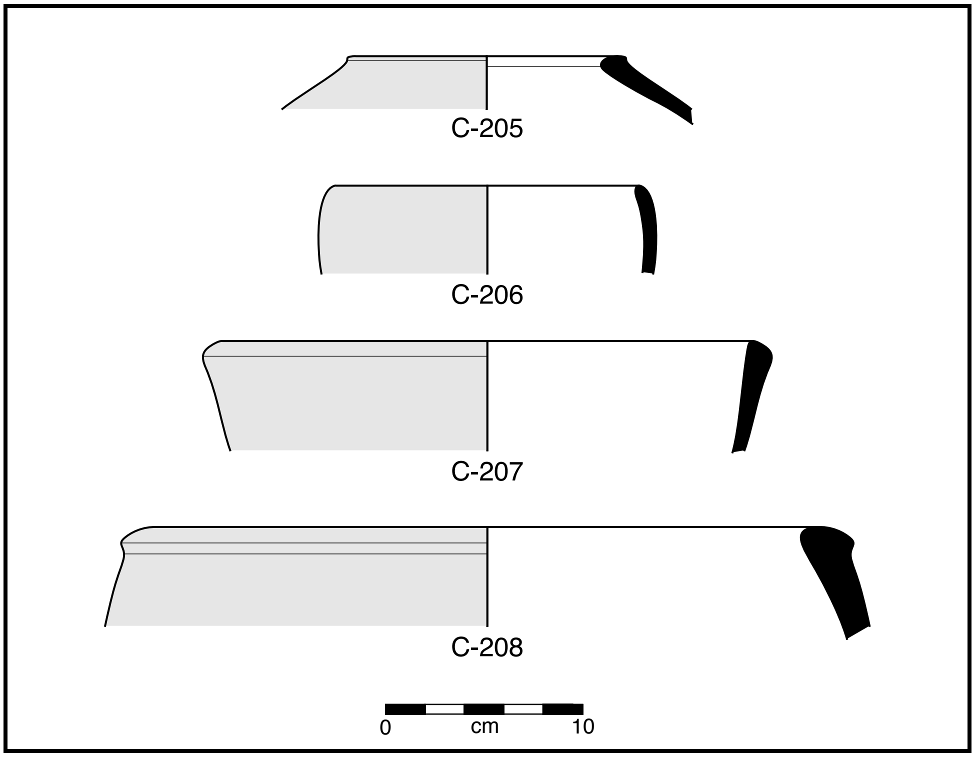

Figure 4.21: Sherds from site S-27.

C-206 Rim sherd of a bowl. Common ware with grit temper. 16cm diameter. Black core, grey toward exterior, orange toward interior. Wet smoothed surfaces. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-8, C-102, C-201, C-203, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.21.)

C-207 Rim sherd of a bowl. Common ware with grit temper. 28cm diameter. Black core, orange toward surfaces. Wheel made. Probably Pre-Islamic, based on associated finds. (See Fig. 4.21.)

C-208 Rim sherd of a large jar. Common ware with grit temper. 34cm diameter. Black core, brown toward surfaces. Interior wet smoothed. Shallow incised wavy band on exterior. Wheel made. Pre-Islamic. (Jūjah Level III). Compare to Hansen *et al.* 2004, Fig. 29.10. (See Fig. 4.21.)

4.2.17 S-28 Ceramics

A village site with substantial standing architecture, S-28's ceramics are utilitarian and Late Islamic in date.

C-181 Rim sherd of a bowl. Common ware with chaff temper. 20cm diameter. Salmon ware. Wheel made. Red slip on interior and exterior surfaces. Late Islamic. (See Fig. 4.22.)

C-182 Rim sherd of a bowl. Common ware with chaff temper. 20cm diameter. Black ware with salmon surfaces. Wheel made. Maroon paint on lip. Late Islamic. (See Fig. 4.22.)

C-183 Rim sherd of a bowl. Common ware with sand temper. 26cm diameter. Salmon ware. Possible self slip on interior and exterior surfaces. Wheel made. Probably Late Islamic, judging by other finds from this site. Compare to C-190. (See Fig. 4.22.)

C-184 Rim sherd of a porcelain cup. Rim diameter indeterminable. Dark blue paint on exterior. Late Islamic. (See Fig. 4.23.)

C-185 Rim sherd of a Chinese porcelain cup. Rim diameter indeterminable. Blue and White Underglaze painting on exterior. Drilled, as if for a hook. Late Islamic. (See Fig. 4.23.)

C-186 Base sherd of a Chinese porcelain cup. Base diameter indeterminable. Blue and White Underglaze painting on exterior. Late Islamic. (See Fig. 4.23.)

C-187 Rim sherd of a Chinese porcelain cup. Rim diameter indeterminable. Blue and White Underglaze painted floral design on exterior. Late Islamic. (See Fig. 4.23.)

4.2.18 S-29 Ceramics

Unlike the village of S-28, over which S-29 stands, this site is not so clearly Late Islamic in date. Though the latest elements of the site are recent in date, there are suggestions of possible earlier structures here. Likewise, the ceramics from S-29, though generally Islamic, are not all definitely Late Islamic. Some may, in fact be Middle Islamic—but owing to the few samples collected, the evidence for such early presence is only tentative.

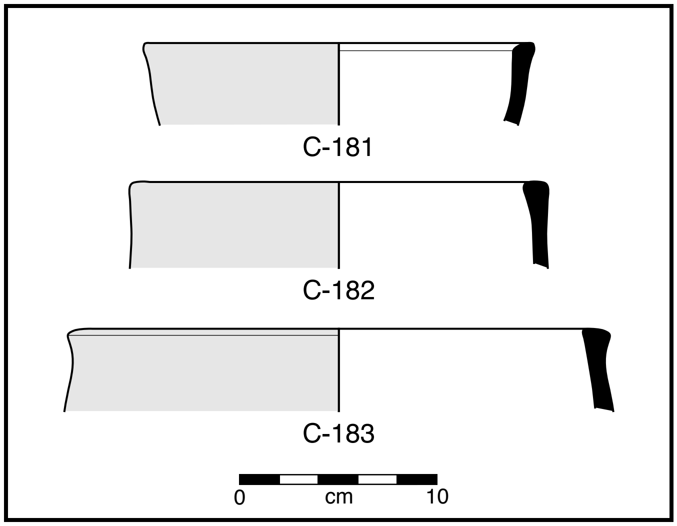

Figure 4.22: Sherds from site S-28. *T to B*: C-181, C-182, C-183.

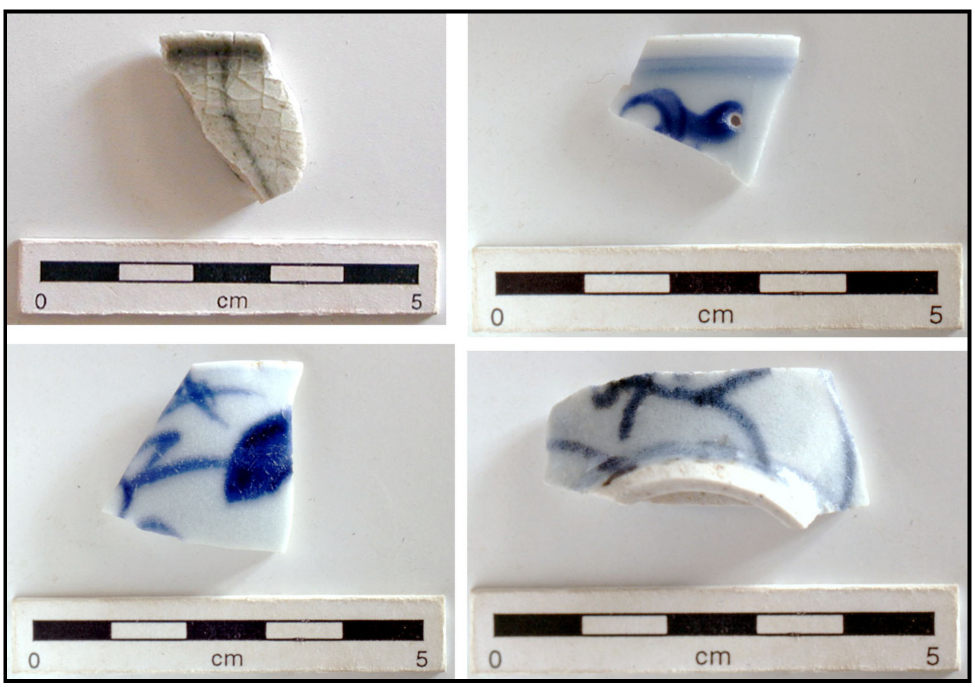

Figure 4.23: Sherds from S-28.

C-66 Whole profile of an unknown vessel type. Common ware with no visible temper. Buff ware with orange slip on all surfaces. Hand made. No curvature to the piece, as if it were from a ceramic box. Interior corner appears to have once held a post or pipe. Probably Late Islamic, judging by other finds from this site. No known comparanda. (See Fig. 4.24.)

C-67 Rim sherd of a vessel of unknown type. Common ware with chaff and grit temper. 30cm diameter. Black core with light orange surfaces. Wet smoothed interior. Perhaps hand made. Grooved lip, as if to accept a lid. Probably Islamic, judging by other finds from this site, but very unusual. No known comparanda. (See Fig. 4.24.)

C-68 Rim sherd of a *zīr*. Common ware with chaff temper. 34cm diameter at inner edge of rim. Black core with light orange surfaces. Fire clouded top of rim. All surfaces wet smoothed. Wheel made. Probably Islamic. (See Fig. 4.24.)

C-69 Body sherd and handle of a vessel of unknown type. Horizontal triangular tab handle. Common ware with grit temper. Diameter indeterminable. Black core with dark brown surfaces (perhaps from the application of a slip). Interior wet smoothed. Probably wheel made. Late Islamic. Compare to C-51. (See Fig. 4.25.)

C-70 Rim sherd of a *zīr*. Common ware with chaff temper. 34cm diameter. Buff core with light orange surfaces. Dark red slip on all surfaces. Wheel made. Middle to Late Islamic. Compare to C-35, C-211, C-218, and Whitcomb 1988, Figs. 4c and 13a. (See Fig. 4.24.)

4.2.19 S-30 Ceramics

As would be expected from the state of preservation of the standing architecture on site S-30, the ceramics collected here are mostly datable to the Late Islamic period. Some sherds, however, could date to the Middle Islamic.

C-145 Rim sherd of a jar. Common ware with chaff and sand temper. 16cm diameter. Buff ware. Wheel made. Late Islamic. Compare to Whitcomb 1988, Fig. 13b (though C-145 is much smaller). (See Fig. 4.26.)

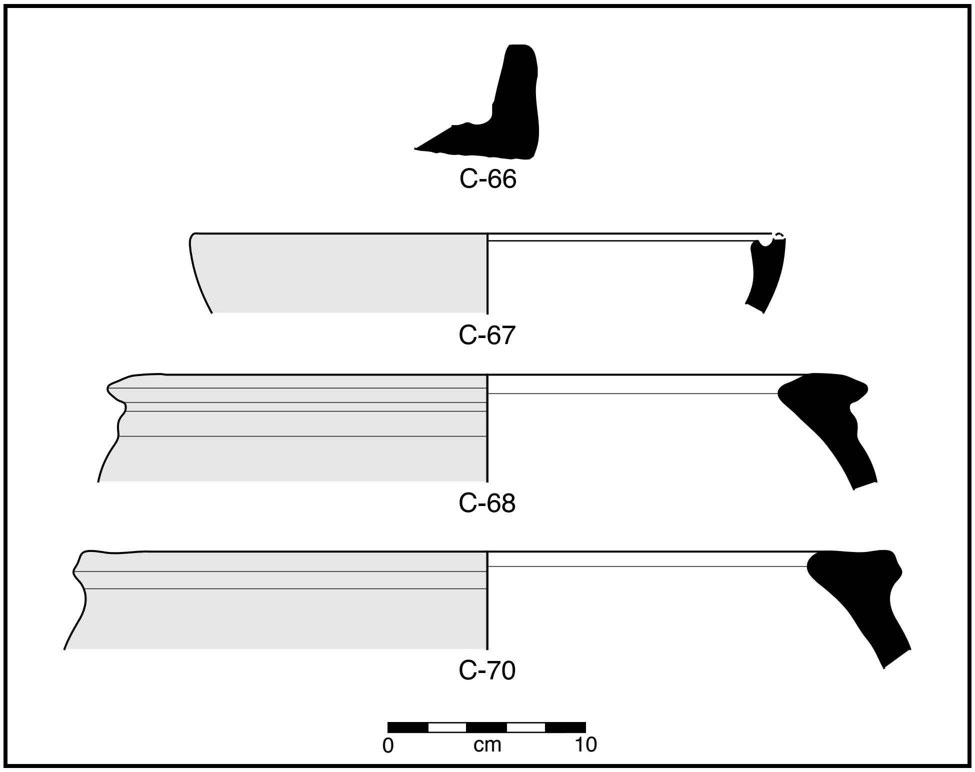

Figure 4.24: Sherds from site S-29.

Figure 4.25: Exterior of sherd C-69 from site S-29.

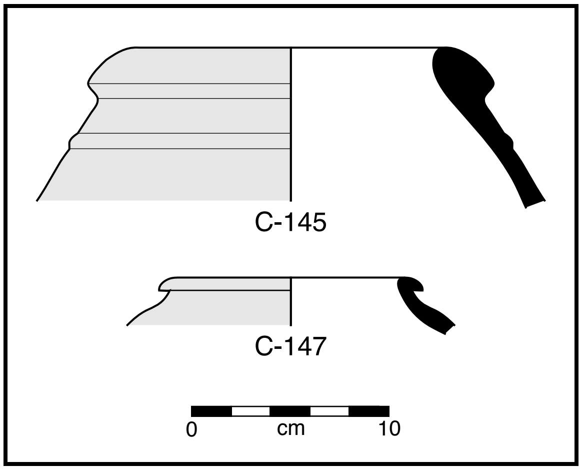

Figure 4.26: Sherds from site S-30.

C-146 Body sherd of a vessel of unknown type. Fine salmon colored ware with sand temper. Green glaze with dark green (underpainted?) stripes on exterior. Probably Middle Islamic. (See Fig. 4.27.)

C-147 Rim sherd of a jar. 12cm diameter. Common salmon colored ware with sand temper. Wheel made. Islamic. (See Fig. 4.26.)

C-148 Body sherd of a vessel of unknown type. 0.7cm thick. Common ware. Black core, salmon colored toward exterior surface, buff exterior surface. Brown painted net design on exterior. Late Islamic. (See Fig. 4.27.)

C-149 Base sherd of a Chinese porcelain cup. 4cm diameter ring base. Blue and White Underglaze painted vegetal design on exterior. Late Islamic. (See Fig. 4.27.)

C-150 Body sherd of a Chinese porcelain cup or bowl. Blue and White Underglaze painting on both surfaces. Late Islamic. Compare net pattern on exterior to C-323. (See Fig. 4.27.)

C-151 Rim sherd of a Chinese porcelain cup. Rim diameter indeterminable. Blue and White Underglaze painting on exterior. Late Islamic. (See Fig. 4.27.)

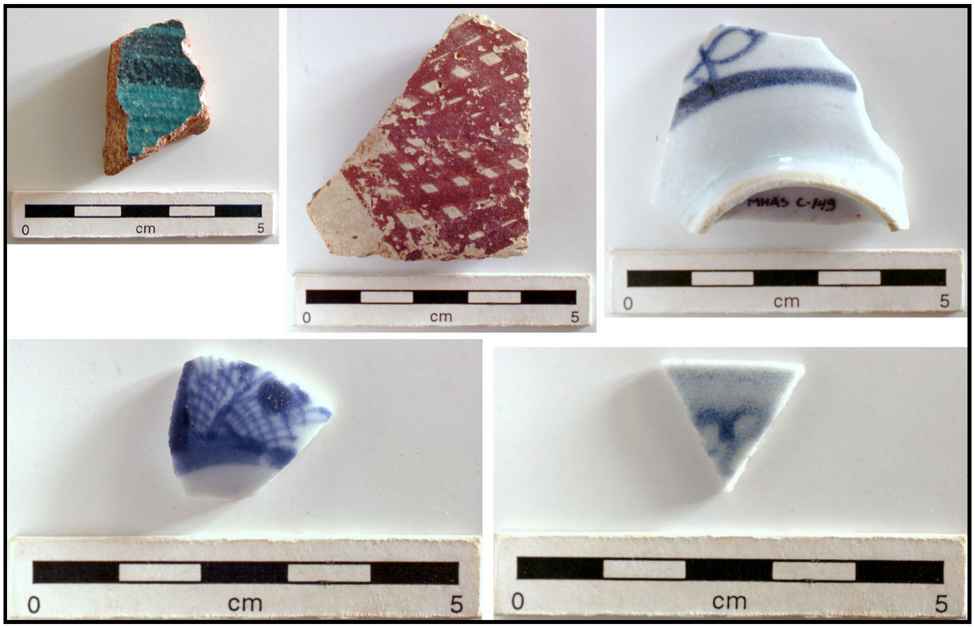

Figure 4.27: Sherds from S-30. *Top Row (L to R)*: C-146, C-148, C-149. *Bottom*: C-150, C-151.

4.2.20 S-32 Ceramics

Though the integrity of this site has been compromised by the expansion of agricultural fields and modern construction, and though the relationship between the site's various constituent parts cannot be assessed without excavation, its ceramics are clearly Pre-Islamic in date.

C-97 Rim sherd of a large jar. Common ware with chaff and grit temper. 32cm diameter. Very dense, almost a stoneware. Black core and interior with buff exterior. Interior surface badly exfoliated. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-105, C-106, C-192, C-199, C-202, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.28.)

C-98 Rim sherd of a jar. Common ware with chaff and grit temper. 14cm diameter. Black core with orange surfaces. Wheel made. Pre-Islamic (Raybūn ER-I). Compare to C-11, C-101, and Sedov 1998, Type 2.0b (ER-I). (See Fig. 4.28.)

C-100 Base and body sherd of a vessel of unknown type. Common ware with grit temper. 8cm diameter ring base. Light pink ware with red surfaces. Surfaces wet smoothed. Wheel made. Pre-Islamic. (See Fig. 4.28.)

C-101 Rim sherd of a jar. Coarse ware with grit temper. 12cm diameter. Light salmon ware. Wheel made. Pre-Islamic (Raybūn ER-I). Compare to C-11, C-98, and Sedov 1998, Type 2.0b (ER-I). (See Fig. 4.28.)

C-105 Rim sherd of a jar. Common ware with chaff temper. 24cm diameter. Black core with red surfaces. Possibly hand made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-97, C-106, C-192, C-199, C-202, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.28.)

C-106 Rim sherd of a jar. Common ware with chaff and grit temper. 22cm diameter. Black ware, orange toward interior. Exterior slipped red. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-82, C-97, C-105, C-192, C-199, C-202, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.28.)

4.2.21 S-33 Ceramics

Ceramics collected at site S-33, including some which are unambiguously Late Islamic, are generally later in appearance than the structure (A-9) with which they are associated. One sherd, however (C-133), is quite likely Early Islamic. Since the site, itself, does not seem to have been in use over such an extended period, this discrepancy is perplexing, and probably represents recurrent informal reuse of the site prior to and succeeding the period that its building was in use.

C-127 Handle of a bowl. Common ware with grit temper. Raised and notched horizontal ridge thickens into triangular tab handle. Burnished exterior. Late Islamic. Compare to C-57, C-88, C-90, C-139, C-391, and Whitcomb 1988, Fig. 13m. (See Fig. 4.29.)

C-128 Rim sherd of a vessel of unknown type. Common ware with grit temper. Rim diameter indeterminable. Grey ware. Exterior may be burnished. Interior badly exfoliated. Could be Pre-Islamic or Islamic in date. (See Fig. 4.29.)

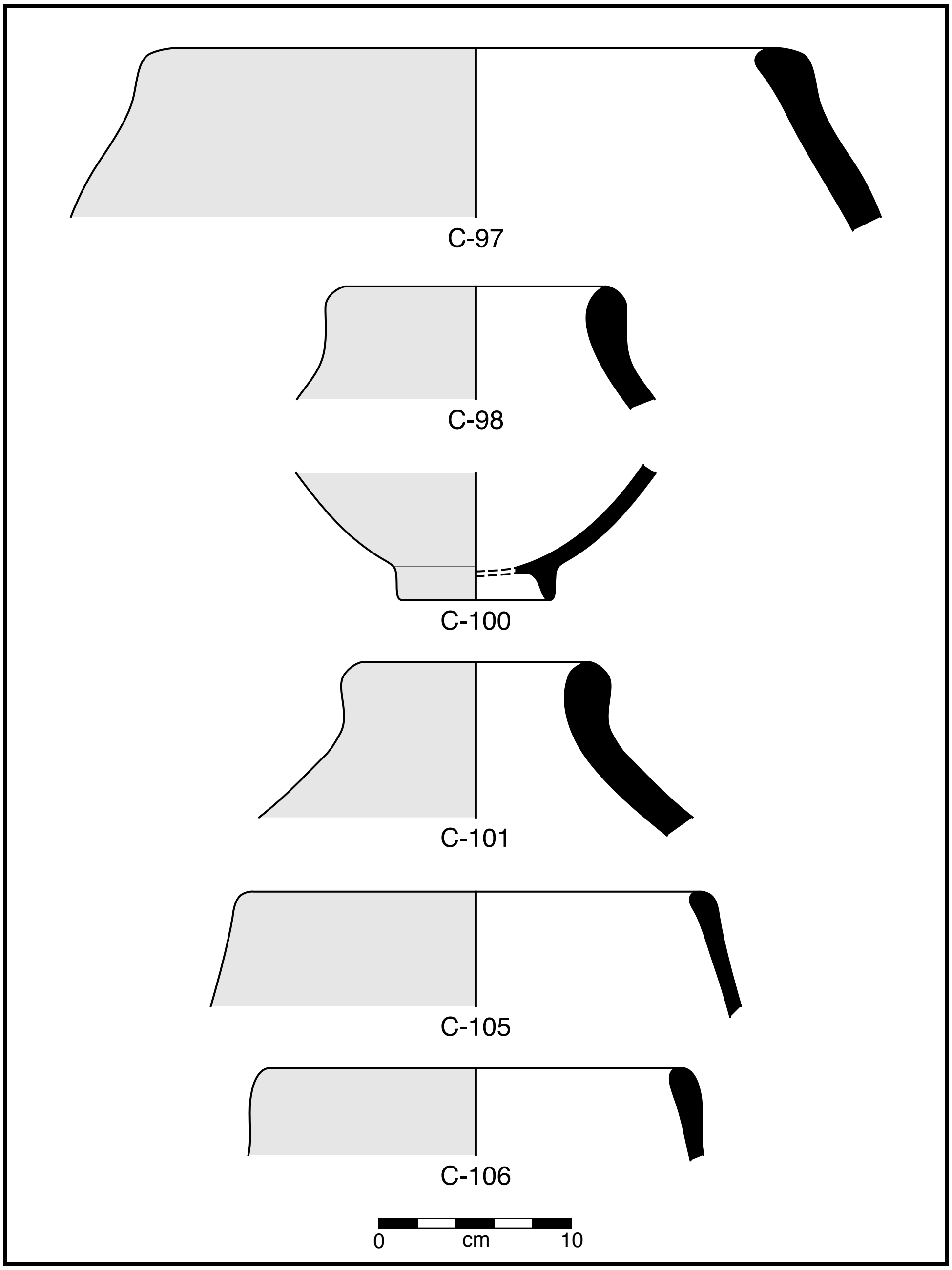

Figure 4.28: Sherds from site S-32.

C-129 Whole profile of a vessel of unknown type. Common ware with grit temper. Black core, buff toward surfaces. Lip and interior have dark orange slip. 7.7cm long, with no discernible curvature, as if it were from a ceramic box. Probably Late Islamic. (See Fig. 4.29.)

C-130 Body sherd of a vessel of unknown type. Common ware with grit temper. Black ware, buff toward surfaces. Wet smoothed. Brown painted crosshatching on exterior. Late Islamic. (See Fig. 4.30.)

C-131 Handle and whole profile of a coffee roasting pan (*miḥmās*). Common ware with grit temper. 12cm diameter. Black ware. Burnished. Late Islamic. Compare to C-231, Posey 1994, Cat. 131, and Whitcomb 1988, Figs. 16i and 17j. (See Fig. 4.29.)

C-132 Body sherd of a Chinese porcelain cup or bowl. Blue and White Underglaze painted vegetal motif on exterior. Drilled, as if for a metal hook. Late Islamic. (See Fig. 4.30.)

C-133 Rim sherd of a bowl. Common ware with grit and sand temper. 24cm diameter. Buff ware. incised wavy lines on exterior. Raised horizontal ridge on the exterior and flattened lip with external overhang. Probably Early Islamic in date, based on the ware color, decoration, and crisp delineation of the horizontal band. (See Fig. 4.29.)

4.2.22 S-34 Ceramics

Sherds collected at site S-34 include a variety of Islamic wares, mostly Late, and including some probable modern pieces. Owing to the location's use as a picnic site, these sherds—especially the porcelain tea cup fragments—may be later contamination unrelated to the primary use of the site. Nevertheless, it is likely that the site, itself, is Middle to Late Islamic.

C-171 Rim sherd of a bowl. Common ware with grit temper. 30cm diameter. Buff core, light salmon toward surfaces. Dark brown slip or wash on interior and exterior surfaces. Islamic. (See Fig. 4.31.)

C-172 Rim sherd of a Chinese porcelain cup. Blue and White Underglaze painting on exterior and rim. Late Islamic. (See Fig. 4.32.)

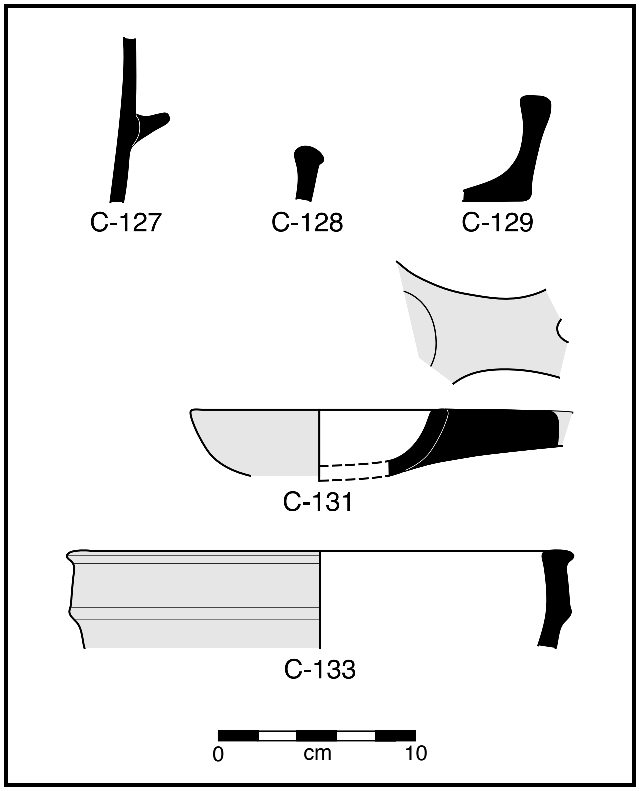

Figure 4.29: Sherds from site S-33.

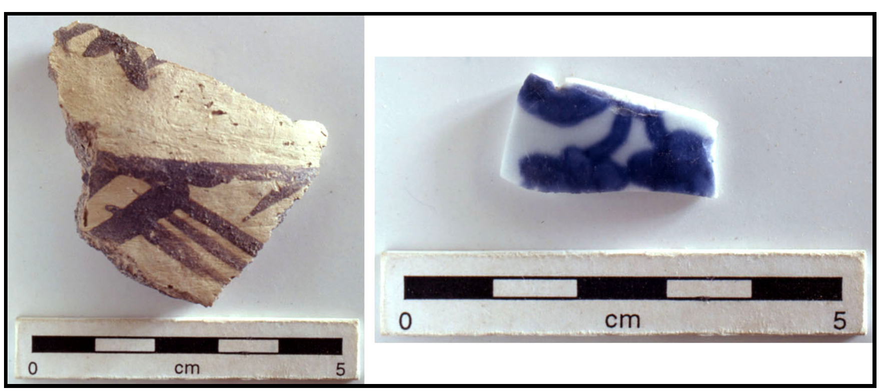

Figure 4.30: Sherds from S-33. *L to R*: C-130, C-132.

C-173 Rim sherd of a Chinese porcelain cup. Blue and White Underglaze painting on exterior. Late Islamic. (See Fig. 4.32.)

C-174 Neck sherd of a bottle. Common ware with chaff temper. 3cm interior diameter. Grey ware (though the coloration is possibly due to burning). Separated at the joint where it was attached to the vessel body. Handle broken off. Red and white painted stripes on exterior surface. Judging by the paint, it may be from the same vessel as C-179. Late Islamic. (See Fig. 4.32.)

C-175 Rim sherd of porcelain cup. Traces of gold painted palm trees are visible on the exterior surface. Probably modern. (See Fig. 4.32.)

C-176 Rim sherd of a porcelain cup. Exterior surface solid cobalt blue. Possibly modern. (See Fig. 4.32.)

C-177 Neck and rim sherd of a bottle. Fine ware with no visible temper. 3cm interior diameter. Rim deformed as if it were turned outward to form a spout. Fine grey ware with buff surfaces. Brown painted stripes, bands, and dots on exterior surface. Late Islamic. Compare to Whitcomb 1988, Fig. 16p. (See Fig. 4.32.)

C-178 Rim sherd of a Chinese porcelain cup. Blue and White Underglaze painted on exterior and interior. Probably from the same vessel as C-180. Late Islamic. (See Fig. 4.32.)

C-179 Body sherd of a vessel of unknown type. Common ware with grit temper. Pink ware. 0.5cm thick. Diameter indeterminable. Maroon slip or wash on exterior. Possibly burnished on exterior surface. Alternating red and white painted stripes on exterior. Judging by the paint, it may be from the same vessel as C-174. Late Islamic. (See Fig. 4.32.)

C-180 Base sherd of a Chinese porcelain cup. Blue and White Underglaze painted on interior and exterior. Exterior badly crazed. Probably from the same vessel as C-178. Late Islamic. (See Fig. 4.32.)

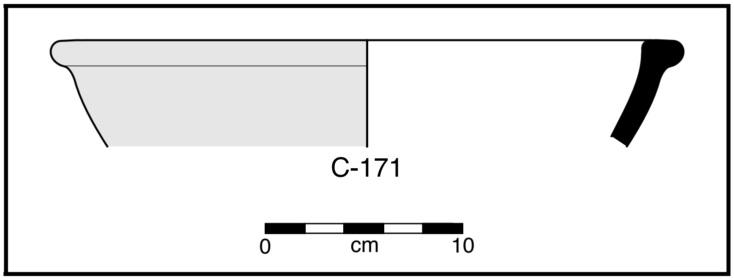

Figure 4.31: Sherd C-171 from site S-34.

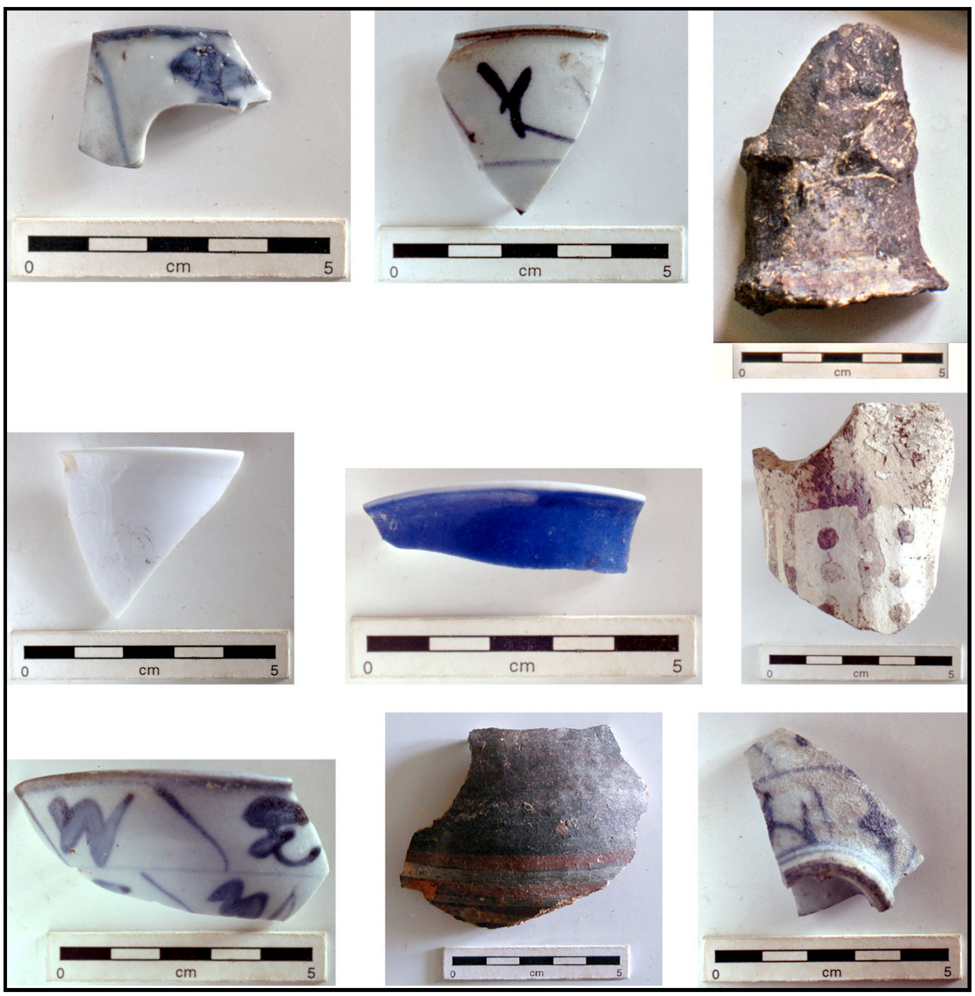

Figure 4.32: Sherds from S-34. *Top Row (L to R)*: C-172, C-173, C-174. *Middle*: C-175, C-176, C-177. *Bottom*: C-178, C-179, C-180.

4.2.23 S-35 Ceramics

Sherds collected at this site are clearly Pre-Islamic in date, roughly contemporaneous with those collected at Jūjah (S-24). As this site's date had been established in previous publications, the sherds collected by MHAS are primarily useful as laboratory comparanda. Accordingly, these collections do bolster the other evidence pointing to a Pre-Islamic date for the site.

C-4 Base sherd of a vessel of unknown type (probably a *zīr*). Common ware with chaff temper. 13cm diameter. Large, heavy sherd comprising most of a tall ring base of a large vessel. Dark orange ware. Wheel made. Pre-Islamic (Raybūn ER-III). Compare to Sedov 1998, Type 5.0 (ER-III). (See Fig. 4.33.)

C-5 Rim sherd with a substantial portion of the wall of a bowl. Common ware with chaff and grit temper. 24cm rim diameter. Bottom edge of sherd starts to turn outward, as if for a ring or pedestal base. Grey core with orange exterior. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-8, C-102, C-201, C-203, C-206, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.34.)

C-6 Body sherd of a vessel of unknown type. Common ware with sand temper. Small sherd, 0.4cm thick. Buff ware with heavy green glaze on exterior. Possibly Early Islamic. (See Fig. 4.33.)

C-7 Rim sherd of a vessel of unknown type. Common ware with grit temper. 16cm rim diameter. Orange ware with maroon (slipped?) surfaces. Wheel made. Could be Pre-Islamic or Islamic in date. (See Fig. 4.34.)

C-8 Rim sherd of a large bowl. Common ware with chaff and grit temper. 30cm rim diameter. Black core with light pink surfaces. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-102, C-201, C-203, C-206, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. 25.1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.34.)

C-9 Rim sherd of a plate. Common ware with chaff temper. 22cm rim diameter. Black core with

Figure 4.33: Sherds from S-35. *L to R*: C-4, C-6.

light orange surfaces. Probably Late Islamic. Compare to C-227, C-402, and C-403. (See Fig. 4.34.)

C-11 Rim sherd of a large jar. Common ware with chaff temper. 16cm rim diameter. Grey ware. wheel made. Pre-Islamic (ER-I). Compare to C-98, C-101, and Sedov 1998, Type 2.0b (ER-I). (See Fig. 4.34.)

C-12 Rim sherd of a bowl with a large section of the vessel wall and an intact handle. Stoneware with grit temper. 22cm. Grey ware. Notched horizontal tab handle. Wheel made. Probably from the same vessel as C-10 and C-13. Pre-Islamic (Šabwa Level VIII). Compare also to Badre 1991, Fig. 25.76 and Hansen *et al.* 2004, Fig. 24.2 (which is similar, but lacks the notches in its handles that C-9 has). (See Fig. 4.34.)

4.2.24 S-36 Ceramics

The features of site S-36 are not necessarily related, except by their physical proximity. As few as they are, the ceramics collected here (including a non-diagnostic fragment of a porcelain teacup not otherwise discussed in this work) contrast with the site's Pre-Islamic inscription (I-1) and attest to the site's episodic reuse, probably as a campsite, across centuries.

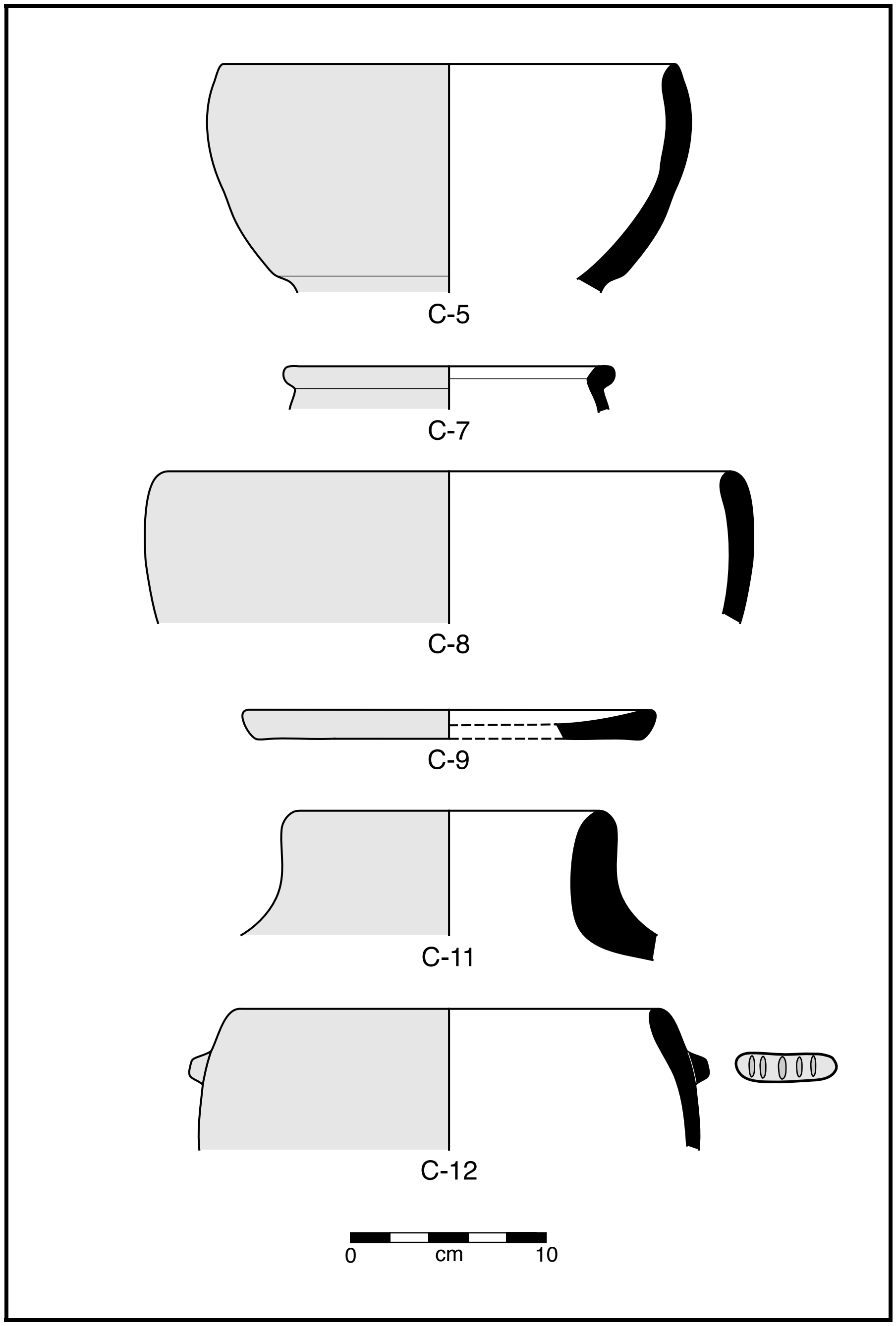

Figure 4.34: Sherds from site S-35.

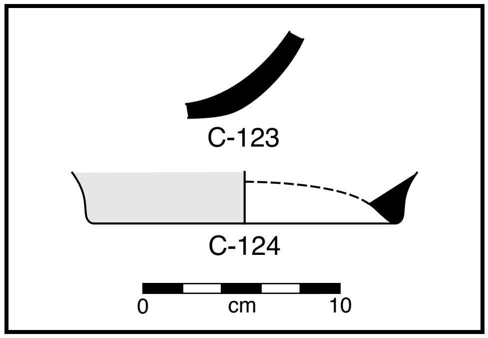

Figure 4.35: Sherds from site S-36.

C-123 Base sherd of a vessel of unknown type. Common ware with grit temper. Salmon ware with red slip on interior and exterior. Diameter indeterminable. Possibly Islamic in date. Compare to C-136 and C-137. (See Fig. 4.35.)

C-124 Base sherd of a vessel of unknown type. Common ware with chaff temper. 16cm base diameter. Black core, orange toward surfaces. heavy buff slip on interior and exterior surfaces. Possible traces of maroon paint on exterior. Badly exfoliated. Perhaps Late Islamic, based on the possible presence of maroon slip. (See Fig. 4.35.)

4.2.25 S-41 Ceramics

Though site S-41 has Musnad inscriptions, the datable ceramics collected here are mostly Late Islamic. All sherds, however, are in poor condition. Owing to the prominence of the site's boulders, it is likely that this was long an attractive spot for travelers to rest—and this probably accounts for the gulf between the date of the site's inscriptions and its sherds.

C-157 Body sherd of a vessel of unknown type. Common ware with no visible temper. Black core with salmon interior surface and buff exterior surface. Brown painted stripes and dots on exterior surface. Late Islamic. (See Fig. 4.36.)

C-159 Rim sherd of a vessel of unknown type. Common ware with grit temper. Diameter indeterminable. Black core with buff surfaces. Wet smoothed. Lip burnished. Probably Islamic

Figure 4.36: Sherds from S-41. *L to R*: C-157, C-161.

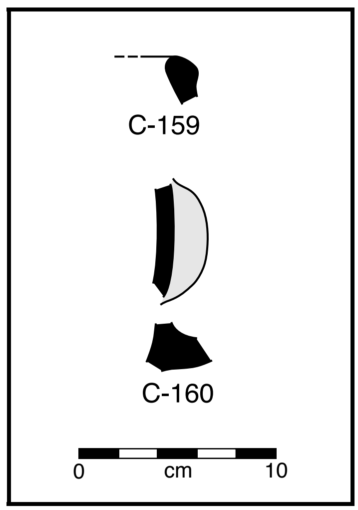

Figure 4.37: Sherds from site S-41.

in date. (See Fig. 4.37.)

C-160 Ledge handle from a vessel of unknown type. Common ware with grit temper. Salmon ware. Burnished surfaces. Probably Late Islamic. (See Fig. 4.37.)

C-161 Neck sherd of a bottle. Common ware. 4cm inside diameter. Possibly from the same vessel as C-153 (and C-155, C-156, and C-165, which are also compared to C-153). Black core and interior, orange exterior. Maroon painted stripes and dots on exterior surface. Late Islamic. Compare to Whitcomb 1988, Fig. 16p. (See Fig. 4.36.)

4.2.26 S-43 Ceramics

The presence of fairly well preserved standing architecture at site S-43 attests to its relatively recent date. This dating is reinforced by the ceramics collected here, which are uniformly Late Islamic.

C-15 Rim sherd of a jar. Common ware with chaff and grit temper. 14cm diameter. Black core, orange toward surfaces. Buff surfaces, possibly slipped. Maroon painted band on rim. Maroon fishnet lozenge design painted on exterior. Joins with C-31, and probably from the same vessel as C-30. Late Islamic. (See Fig. 4.38.)

C-16 Rim sherd of a cup. Common ware with chaff and sand temper. 8cm diameter. Light orange core and interior. Buff exterior, possibly slipped. Brown paint on lip and exterior of rim. Vertical brown painted stripes on exterior. Probably from the same vessel as C-18. Middle Islamic to Late Islamic. (See Fig. 4.38.)

C-19 Body sherd of Chinese porcelain cup. Cream ware. Blue and White Underglaze painted chrysanthemum design on exterior. Late Islamic, possibly 19th Century. Compare to C-341, C-342, Hardy-Guilbert and Rougeulle 1997, Fig. 5.9, and Whitcomb 1988, Figs. 22b and 23w. (See Fig. 4.39.)

C-22 Body sherd of a vessel of unknown type. Common ware with chaff and grit temper. Black core with buff surfaces. Maroon painted lines on exterior. Hand made. Probably from the same vessel as C-20 and C-27. (See Fig. 4.39.)

C-23 Body sherd of a Chinese porcelain cup. Blue and White Underglaze painting on exterior, with red underglaze painting atop blue paint. Two dark blue lines painted on interior. Probably from the same vessel as C-17 and C-21. Late Islamic (17th Century and later). Compare also to C-122. (See Fig. 4.39.)

C-24 Body sherd of a vessel of unknown type. Common ware with grit temper. Black core with light pink surfaces. Exterior has maroon painted horizontal lines and rows of dots, in alternation. Probably hand made. Late Islamic. (See Fig. 4.39.)

C-25 Rim sherd of a bowl. Stoneware with grit temper. 28cm diameter. Grey ware. Vertical notched ridge on exterior. Exterior wet smoothed. Wheel made. Probably from the same vessel as C-14. Probably Late Islamic. Compare to C-14, C-87, and C-191. (See Fig. 4.38.)

C-26 Body and handle of a bottle. Common ware with grit temper. 5cm diameter. Modeled vertical tab extending upward (or downward, if the piece is inverted) near the top (or bottom) of a loop handle. Black core and interior. Exterior covered with light orange slip. Traces of maroon painted lines on tip of handle tab, and at the join between the handle and the vessel wall. Hand made. Probably Late Islamic. (See Fig. 4.38.)

C-28 Base sherd of a vessel of unknown type. Common ware with grit temper. 14cm diameter. Black core and interior, with orange exterior. Small bits of maroon on exterior. may be the last remaining traces of slip or paint. Probably wheel made. Probably Islamic in date, judging by the suggestions of maroon paint. Compare to C-259 and C-320. (See Fig. 4.38.)

C-31 Body sherd of a jar. Common ware with chaff temper. 24cm diameter. Black core, light orange toward surfaces. Buff slip on surfaces. Dark maroon painted fishnet lozenges on exterior. Joins with C-15 and is probably from the same vessel as C-30. Late Islamic. (See Fig. 4.39.)

4.2.27 S-45 Ceramics

S-45 is a Pre-Islamic irrigation installation not unlike those found in the vicinity of Raybūn and documented by the SoYCE expedition.[16] Accordingly, most of the ceramics collected here are easily identifiable as Pre-Islamic forms. As S-45 was likely not the primary locus for the use of these vessels, we can assume that they were probably brought here, from the nearby urban centers, by water flow or by manuring.

[16] Sedov, 1995c.

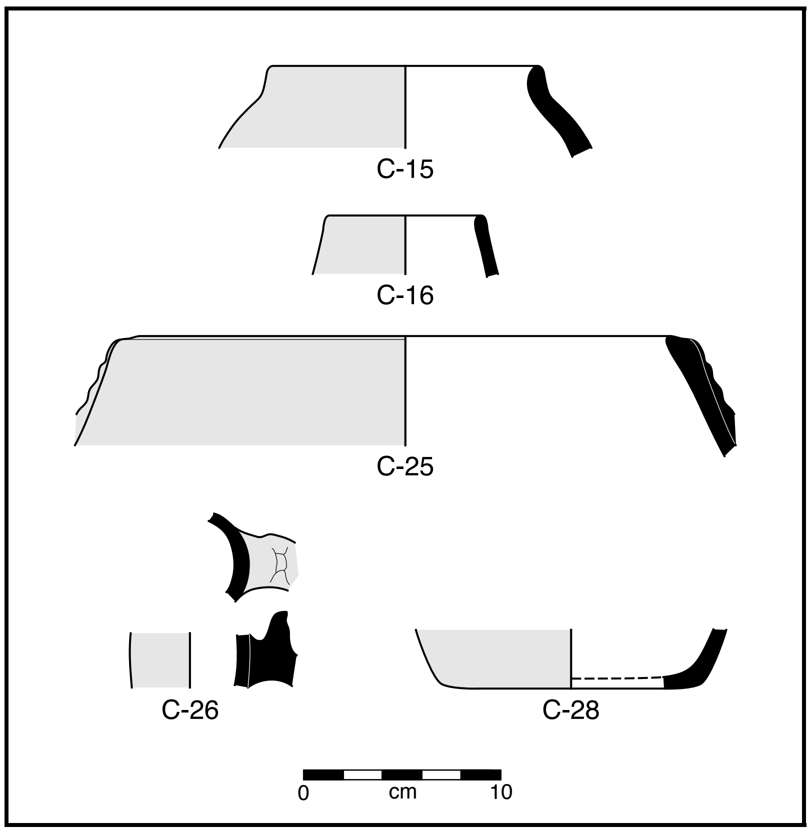

Figure 4.38: Sherds from site S-43.

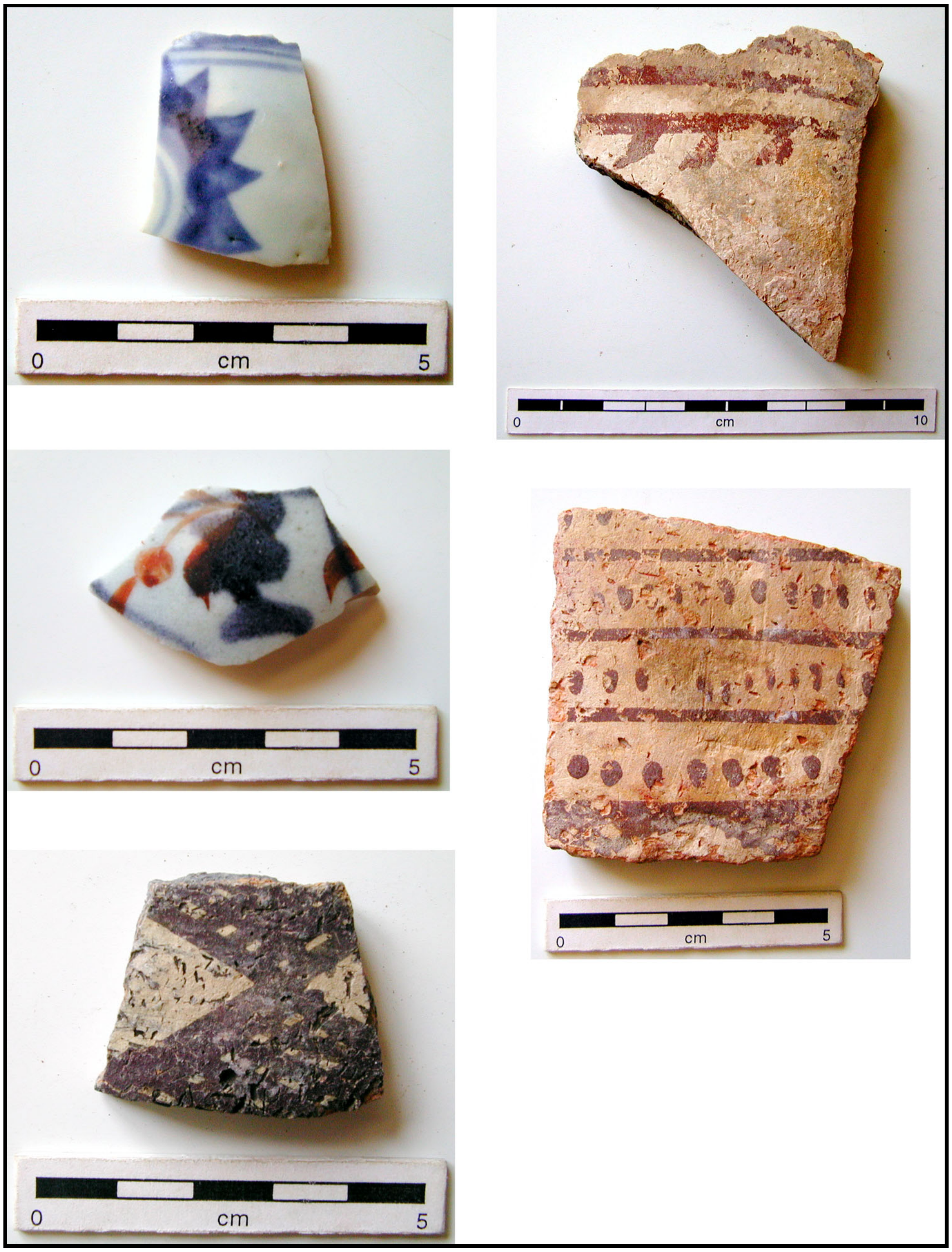

Figure 4.39: Sherds from S-43. *Top Row (L to R)*: C-19, C-22. *Middle*: C-23, C-24. *Bottom*: C-31.

C-37 Rim sherd of a jar. Common ware with chaff and grit temper. Rim diameter indeterminable. Grey core and interior with light salmon exterior. Lightly incised wavy band on exterior. Wheel made. Pre-Islamic (Raybūn LR-I). Compare to C-195, C-326, C-350, C-351, C-368, C-371, and Sedov 1998, Type 2.1 (LR-I). (See Fig. 4.40.)

C-39 Base sherd of a vessel of unknown type. Common ware with grit temper. 10cm diameter. Buff ware. Wheel made. Pre-Islamic. Compare to C-47, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.40.)

C-40 Rim sherd of a jar. Common ware with grit temper. Rim diameter is indeterminable. Dense, almost a stoneware. Grey core and interior with light orange exterior. Wheel made. Pre-Islamic (Jūjah Levels IV to III). Compare to C-75, C-80, C-205, C-324, C-330, C-364, C-366, and Hansen *et al.* 2004, Figs. 27.1–4, and 31.1–8. (See Fig. 4.41.)

C-42 Base sherd of a vessel of unknown type. Common ware with grit temper. 11cm diameter. Grey ware. Wheel made. Pre-Islamic (Raybūn ER-III to MR-I). Compare to C-39, C-47, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Sedov 1998, Type 2.0 (ER-III) and Type 2.1 (MR-I). (See Fig. 4.40.)

C-43 Rim sherd of a bowl. Stoneware with grit temper. Rim diameter indeterminable. Black core with maroon interior and buff exterior. Pierced below rim, as if for hanging. Probably wheel made. Pre-Islamic. (See Fig. 4.40.)

C-44 Rim sherd of a jar. Common ware with grit temper. 26cm diameter. Hole mouth jar. Grey core with light salmon interior and maroon exterior. Dense, almost a stoneware. Pre-Islamic (Jūjah Level IV). Compare to C-78 and Hansen *et al.* 2004, Fig. 27.1. (See Fig. 4.40.)

C-45 Rim sherd of a jar. Common ware with chaff and grit temper. 16cm diameter. Hole mouth jar. Grey core with light salmon surfaces. Incised wavy band on exterior. Wheel made. Pre-Islamic. (See Fig. 4.40.)

C-46 Rim sherd of a bowl. Common ware with grit temper. 26cm diameter. Black core with light orange interior and buff exterior. Wheel made. Pre-Islamic (Jūjah Level IV). Compare to Hansen *et al.* 2004, Fig. 25.3. (See Fig. 4.40.)

C-47 Base sherd of a vessel of unknown type. Common ware with chaff temper. 13cm diameter. Pedestal base fragment. Light pink core with buff surfaces. Wheel made. Pre-Islamic. Compare to C-39, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.40.)

4.2.28 S-46 Ceramics

Site S-46 appears to be a lone structure, reconstructed on multiple occasions. Ceramics collected here range from definite Pre-Islamic forms to Late Islamic ones. This range supports the supposition, based on the site's architecture, that the site was active across millennia—whether or not that activity was continuous. However, since the latest phase of the structure here is built atop the alluvium from Pre-Islamic irrigation, it is not impossible to suppose that the structure is relatively recent and that the earlier sherds are intrusions from lower levels upon this later structure. Conversely, the structure could be of some earlier date, and the latest sherds could be relatively recent contamination of the site. But regardless of the actual date of the site and the absolute provenance of its sherds, the presence here of some unique sherds (C-344, C-345, C-355, and C-356) warrants further investigation.

C-344 Body sherd of a vessel of unknown type. Fine ware with sand temper. Dark reddish-brown ware. Thin mottled translucent mustard colored glaze on exterior. Probably from same vessel as C-345. Owing to its unusual fabric and glaze, this is almost certainly an imported ware, possibly Islamic in date, but perhaps Roman. (See Fig. 4.42.)

C-347 Base sherd of a Chinese porcelain cup. 3cm diameter. Trace of Blue and White Underglaze painting on interior bottom. Late Islamic. (See Fig. 4.43.)

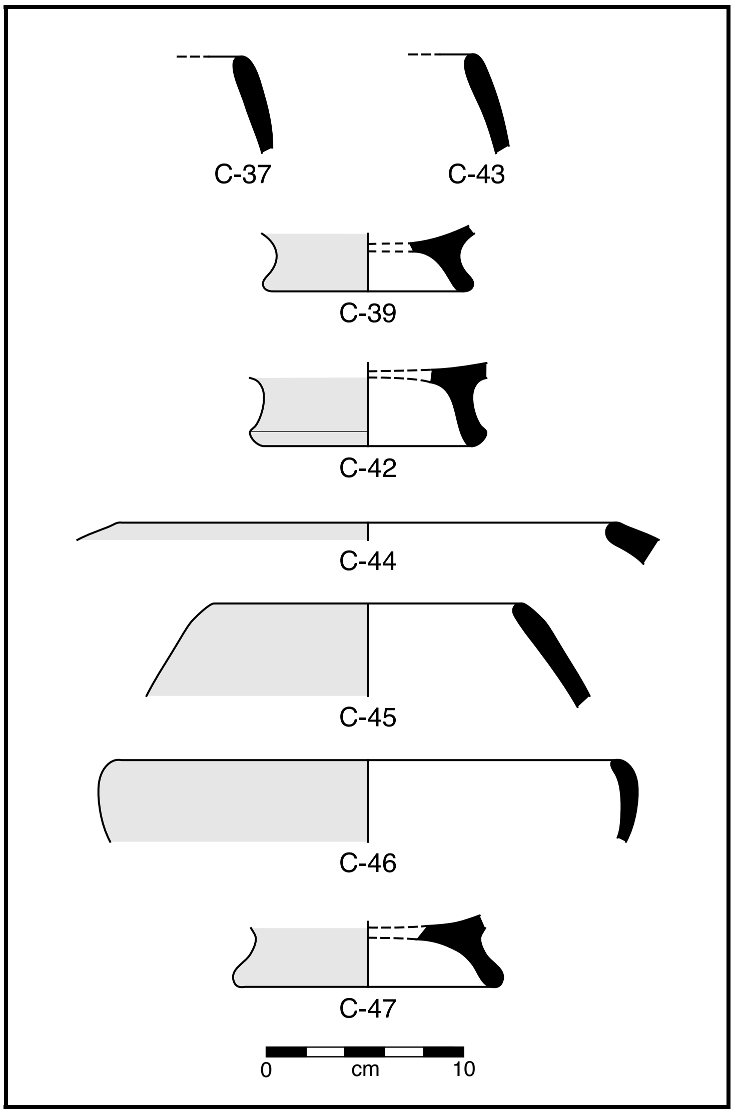

Figure 4.40: Sherds from site S-45.

Figure 4.41: Exterior of sherd C-40 from site S-45.

C-348 Rim sherd of a bowl. Common ware with chaff temper. 26cm diameter. Black core, salmon towards surfaces. Interior surface wet-smoothed. Wheel made. Perhaps Late Islamic. (See Fig. 4.43.)

C-350 Rim sherd of a jar. Stoneware with chaff and grit temper. 18cm diameter. Black core, with dark orange interior and maroon exterior. Wet-smoothed and lightly burnished on interior and exterior. Wheel made. Pre-Islamic (Raybūn MR-I to LR-I). Compare to C-37, C-195, C-326, C-351, C-368, C-371, and Sedov 1998, Type 2.1 (MR-I to LR-I). (See Fig. 4.43.)

C-352 Rim sherd of a bowl. Common ware with chaff and grit temper. 32cm diameter. Black core with orange interior and brown exterior. Wet-smoothed interior. Very similar to C-355, except for the latter's cross-hatched interior. Wheel made. Pre-Islamic, probably Raybūn ER-I. Compare to Sedov 1998, Type 1.0 (ER-I). (See Fig. 4.43.)

C-353 Base of a vessel of unknown type. Common ware with chaff and grit temper. 18cm diameter. Black core with light salmon interior and buff exterior. Possibly hand made. Brown painted band on exterior at point of inflection. Late Islamic, based on the use of brown paint. (See Fig. 4.43.)

C-355 Rim sherd of a bowl. Common ware with chaff and grit temper. 38cm diameter. Black core with orange interior and maroon exterior. Wheel made. Incised cross-hatchining on interior. Very similar in shape to C-352. Possibly from the same vessel as C-356, which also has deeply incised cross-hatching on its interior. Pre-Islamic, possibly Raybūn ER-I. Compare to Sedov 1996a, Fig. 21.4. (See Figs. 4.43 and 4.44.)

C-357 Base sherd of a vessel of unknown type. Coarse ware with grit temper. 14cm diameter. Black core with buff exterior and maroon interior. Interior wet smoothed. Wheel made. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.43.)

C-358 Base sherd of a vessel of unknown type. Stoneware with grit temper. 16cm diameter. Light orange ware. Wheel made. Pre-Islamic. Compare to C-39, C-47, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.43.)

C-359 Base sherd of a large vessel of unknown type. Common ware with chaff and grit temper. 24cm diameter. Brown core with maroon interior and light salmon exterior. Wheel made. Probably Pre-Islamic in date, based on the well-fired ware and uncommon form. (See Fig. 4.43.)

4.2.29 S-48 Ceramics

Site S-48, despite the standing foundations of its lone structure, had the appearance of a relatively early Islamic lookout. Few sherds were collected here, and those that were are probably Late Islamic in date—suggesting a later date for the structure than its architecture immediately presents.

C-32 Rim sherd of a *zīr*. Common ware with chaff and grit temper. 37cm diameter. Light orange ware. Red slip on interior and exterior. Exterior has incised wavy band. Wheel made.

Figure 4.42: Exterior of sherds C-344 and C-345 from site S-46, showing mottled glaze.

Probably Late Islamic in date. Compare to C-58, C-85, C-307, C-309, and C-310. (See Fig. 4.45.)

C-35 Rim sherd of a *zīr*. Common ware with chaff temper. Rim diameter indeterminable, but in excess of 30cm. Black core with salmon surfaces. Exterior and rim have orange to maroon slip (the varying color is probably due to fire clouding). Exterior has incised wavy band. Irregular surface, possibly indicating that this vessel was hand made. Late Islamic. Compare to C-70, C-211, C-218, and Whitcomb 1988, Fig. 13a. (See Fig. 4.45.)

4.2.30 S-50 Ceramics

The standing architecture of site S-50, a castle or fortress commanding a prominent view of the valley below, is clearly of relatively recent date. However, its mud brick walls are built atop what are apparently Pre-Islamic foundations. Despite the presence of standing architecture only one sherd was collected here. The painted decoration of this sherd, C-126, is Late Islamic or perhaps Middle Islamic in date.

C-126 Neck sherd of a bottle. Common ware with grit temper. Tapering neck, separated from the vessel body at the joint where these two sections met. Scar where the handle was broken

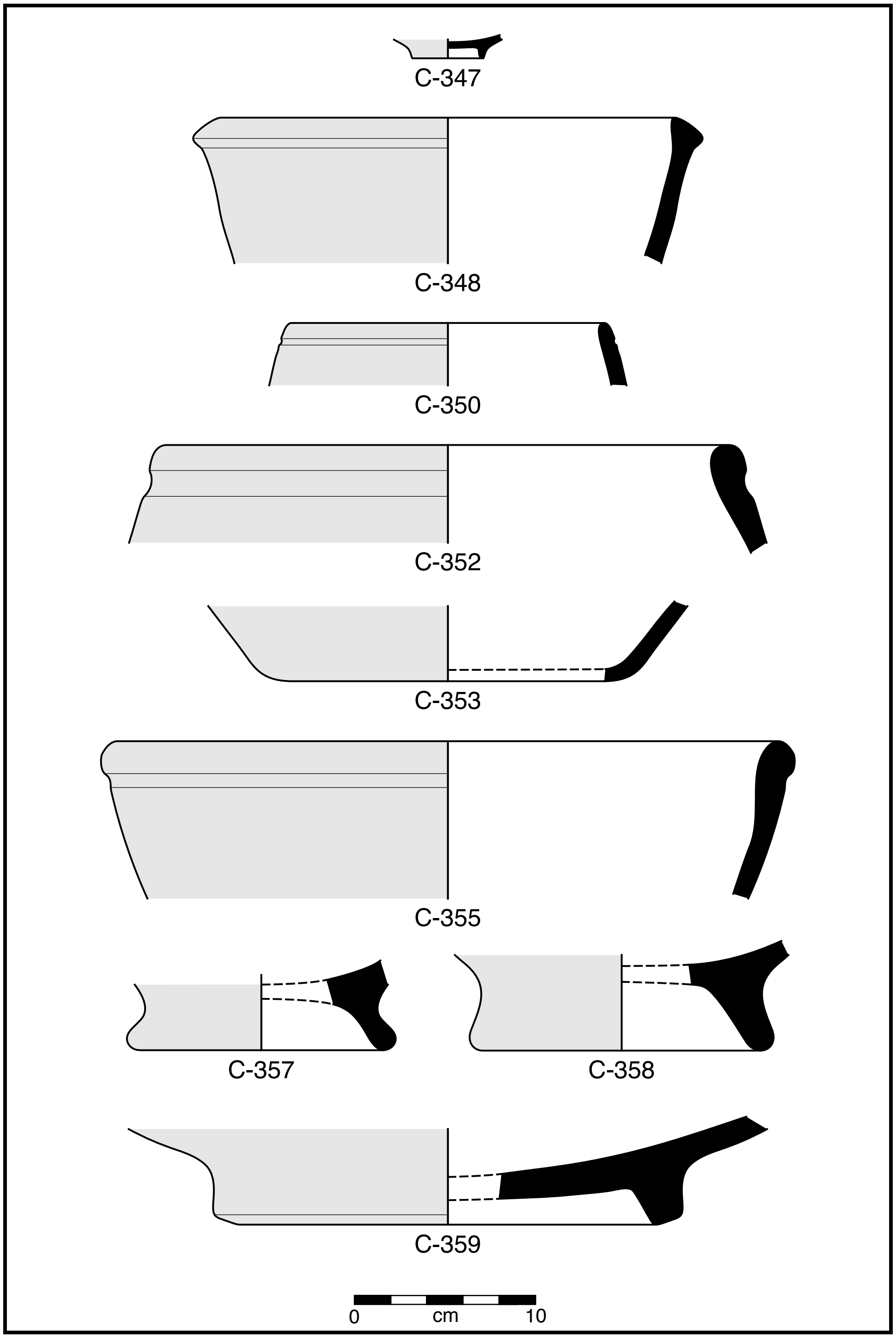

Figure 4.43: Sherds from site S-46.

Figure 4.44: Interior of sherd C-355 from site S-46, showing incised crosshatching.

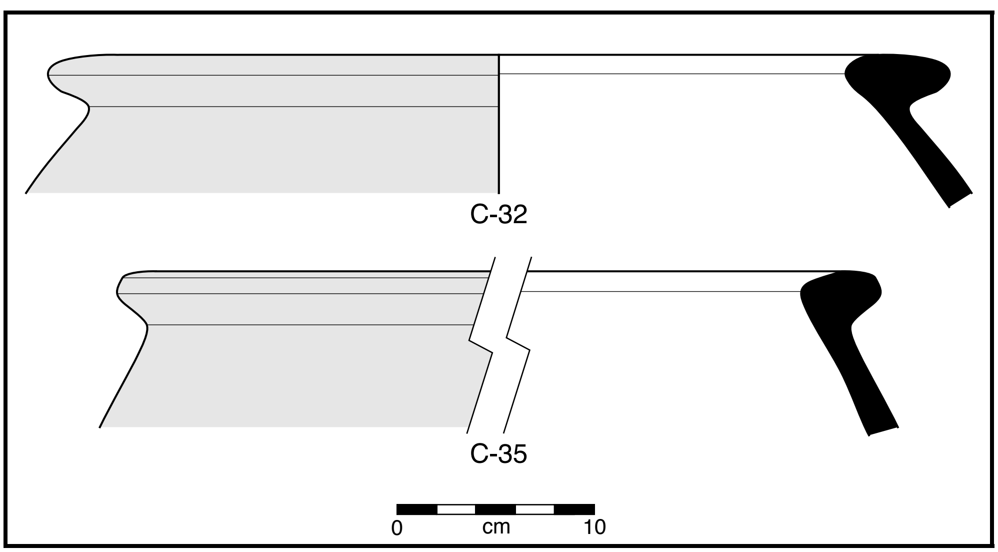

Figure 4.45: Sherds from site S-48.

Figure 4.46: Exterior of sherd C-126 from site S-50.

from this sherd. Buff ware. Hand made. Black paint on exterior surface. Middle Islamic to Late Islamic. Compare to Whitcomb 1988, Figs. 11n, 16o, and 16p. (See Fig. 4.46.)

4.2.31 S-51 Ceramics

Site S-51 is a small village with structures that, based on the relative preservation of their mud brick superstructures, span a range of dates. Datable ceramics collected here are typical utilitarian wares of the Late Islamic period. However, other sherds from the site (also utilitarian wares) are more generically Islamic and may be several centuries older.

C-85 Rim sherd of a large jar. Common ware with chaff temper. Rim diameter indeterminable. Light pink ware. Red slip on interior and exterior. Incised wavy band on exterior. Wheel made. Probably Late Islamic in date. Compare to C-32, C-58, C-307, C-309, and C-310. (See Fig. 4.47.)

C-86 Rim sherd of a bowl. Common ware with grit temper. 26cm diameter. Black core with pink interior and light pink exterior. Interior wet smoothed. Surfaces may be lightly burnished. Shallow vertical notches on exterior of thickened rim. Wheel made. Probably Late Islamic in date. (See Fig. 4.47.)

C-87 Rim sherd of a bowl. Common ware with grit temper. 20cm diameter. Grey ware with light maroon surfaces. Interior and exterior wet smoothed. Vertical notched ridge on exterior, extending downward from lip. Probably from the same vessel as C-90. Late Islamic. Compare to C-14, C-25, C-90, and C-191. (See Fig. 4.47.)

C-88 Body sherd and handle of a bowl. Common ware with chaff and grit temper. Horizontal, notched, triangular tab handle. Vessel wall curves at the bottom. Black core with light salmon surfaces. Interior wet smoothed. Exterior below handle worn or perhaps burnished. Late Islamic. Compare to C-57, C-90, C-127, C-139, C-391, and Whitcomb 1988, Fig. 13m. (See Fig. 4.47.)

C-89 Body sherd of a vessel of unknown type. Common ware with chaff and grit temper. Black core and interior with dark orange exterior. Maroon painted stripes on exterior. Hand made. Joins with C-96, and probably from the same vessel as C-92. Late Islamic. (See Fig. 4.48.)

C-90 Body sherd and handle of a vessel of unknown type. Common ware with grit temper, almost a stoneware. Light pink ware. Horizontal, triangular, notched tab handle. Probably from the same vessel as C-87. Late Islamic. Compare to C-57, C-87, C-88, C-127, C-139, C-391, and Whitcomb 1988, Fig. 13m. (See Fig. 4.48.)

C-91 Rim sherd of a jar. Common ware with chaff temper. 24cm diameter. Buff ware. Brown slip on surfaces. Wheel made. Probably Islamic in date. (See Fig. 4.47.)

C-93 Rim sherd of a jar. Common ware with grit temper, almost a stoneware. 26cm diameter (though, due to the sherd's state of preservation, the actual diameter may be somewhat smaller). Orange ware. Badly eroded. Probably Islamic in date. (See Fig. 4.47.)

C-94 Rim sherd of a jar. Common ware with chaff and sand temper. 20cm diameter. Dark orange ware with fire clouded surfaces. Interior burnished. Exterior lightly burnished. Wheel made. Probably Islamic in date. (See Fig. 4.47.)

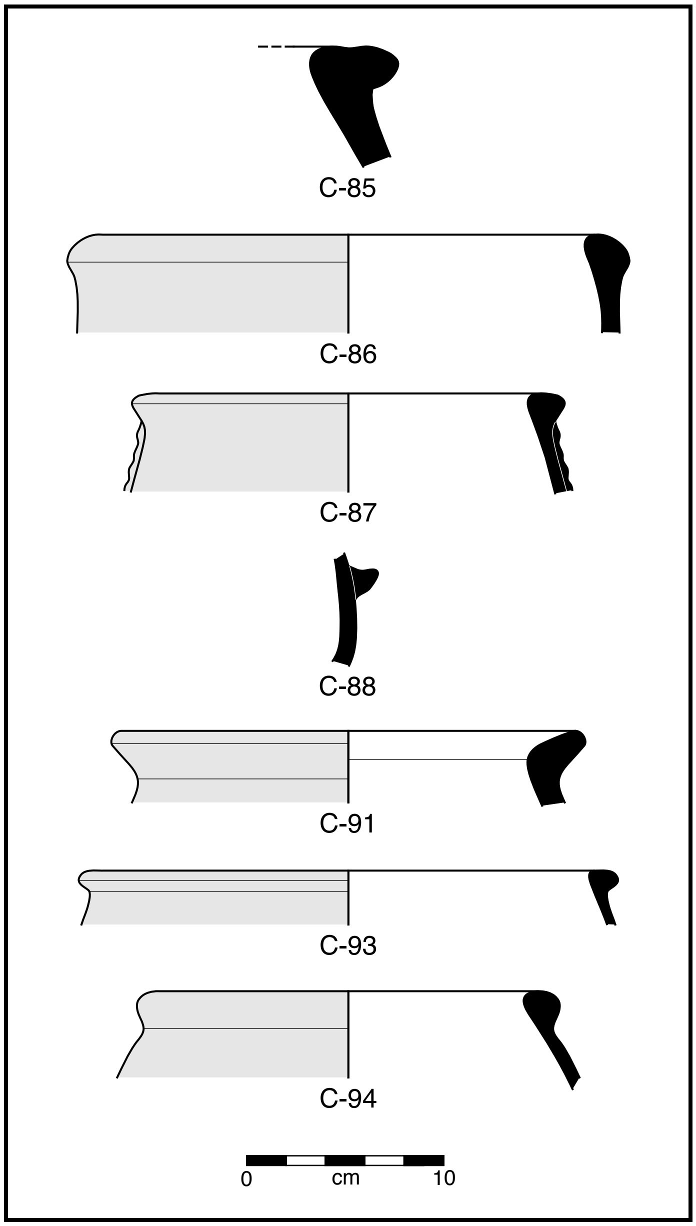

Figure 4.47: Sherds from site S-51.

Figure 4.48: Sherds from site S-51. *L to R*: C-90, C-96 and C-89 (joined).

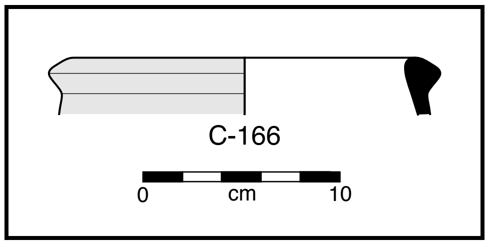

Figure 4.49: Sherd C-166 from site S-53.

4.2.32 S-53 Ceramics

S-53 is clearly a prehistoric site, but has one structure that, based on the preserved height of its crude foundations, is an Islamic period lookout of some kind. Only one sherd (C-166) was collected at this site—within the walls of the site's later feature (A-19). This sherd's date, unfortunately, is indeterminate beyond the unlikeliness of its being Pre-Islamic (and, therefore the likeliness of its being Islamic in date).

C-166 Rim sherd of a jar. Common ware with sand temper. 18cm diameter. Orange ware. Interior surface wet smoothed. Wheel made. Lip burnished. Maroon painted band on outer edge of rim. Probably Islamic in date. (See Fig. 4.49.)

4.2.33 S-54 Ceramics

Site S-54, with its ephemeral traces of temporary architecture, yielded few sherds (and in very poor condition). The sherds collected are probably Pre-Islamic in date, but owing to their poor preservation, one cannot be especially certain.

C-134 Rim sherd of a bowl. Coarse ware with grit temper. 20cm diameter. Black core with buff surfaces. Wheel made. Possibly Pre-Islamic in date. (See Fig. 4.50.)

C-135 Rim sherd of a bowl. Coarse ware with chaff and grit temper. 22cm diameter. Buff ware. Possibly Pre-Islamicin date. (See Fig. 4.50.)

C-136 Base sherd of a vessel of unknown type. Coarse ware with grit temper. 24cm diameter. Badly exfoliated. (Loss of the inner surface, at the bottom of the vessel, suggests that the base of the sherd is thicker than depicted in the illustration.) Joins with C-137. Possibly Pre-Islamic in date. Compare also to C-123. (See Fig. 4.50.)

C-138 Base sherd of a vessel of unknown type. Common ware with chaff and grit temper. Diameter indeterminable. Black ware with buff exterior surface. Unknown whether this is Pre-Islamic or Islamic in date. (See Fig. 4.50.)

4.2.34 S-55 Ceramics

Site S-55 is a small village. Though its most recent abandonment appears to have been relatively recent (within the last two centuries), the foundations of some of its structures—house A-21 in particular—are clearly reused from earlier occupations. The ceramic evidence collected here confirms this supposition, as most sherds are Late Islamic in date, but some are evidently Pre-Islamic. Sherd C-60, with its fragmentary Musnad inscription, is particularly noteworthy in this regard.

C-48 Rim sherd of a bowl. Common ware with grit temper. 14cm diameter. Grey core with orange exterior and buff interior. Interior wet smoothed. Maroon paint on lip, and maroon painted slash on exterior. Hand made. Islamic in date. (See Fig. 4.51.)

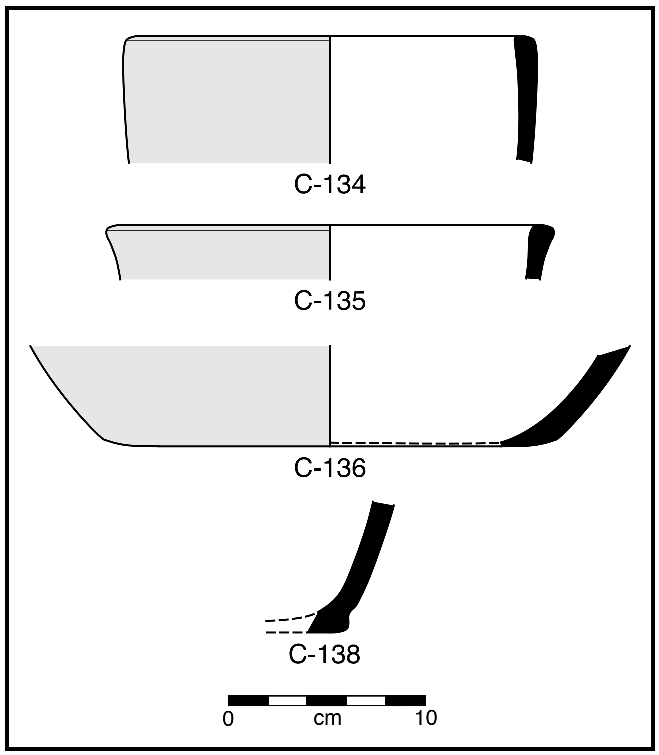

Figure 4.50: Sherds from site S-54.

C-51 Body and handle of a bowl. Common ware with chaff and grit temper. Horizontal triangular tab handle. Black core with light salmon surfaces. Late Islamic. Compare to C-69. (See Fig. 4.52.)

C-52 Rim sherd of a jar. Common ware with grit temper. Rim diameter indeterminable. Dark pink ware with maroon surfaces. Surfaces wet smoothed. Wheel made. Probably Late Islamic in date. (See Fig. 4.51.)

C-53 Rim sherd of a jar. Common ware with grit temper. 20cm diameter. Light orange ware. Surfaces wet smoothed. Lip lightly burnished. Wheel made. Probably Late Islamic in date. (See Fig. 4.51.)

C-58 Rim sherd of a large jar. Common ware with no visible temper. Rim diameter indeterminable. Buff ware. Brown slip on exterior and interior. Wide wavy band incised into the exterior. Wheel made. Probably Late Islamic in date. Compare to C-32, C-85, C-307, C-309, and C-310. (See Fig. 4.51.)

C-59 Rim sherd of a bowl. Common ware with chaff temper. 14cm diameter. Grey core with orange surfaces. Interior wet smoothed. Wheel made. Probably Islamic in date. (See Fig. 4.51.)

C-60 Rim sherd of a large jar. Coarse ware with grit temper. Rim diameter indeterminable, but probably in excess of 30cm. Black ware with orange interior. Inscribed with the Musnad letter 𐩼 on the interior (I-50). Pre-Islamic (Raybūn MR-II). Compare to Sedov 1998, Type 5.0 (MR-II). (See Fig. 4.51.)

C-62 Rim and spout of a jar. Common ware with chaff temper. 14cm rim diameter (approximately). Buff ware. Applied spout just below the vessel rim. Brown painted net design on spout, with brown painted dots on its underside. Brown paint also on the lip of the vessel and the interior of the upper edge of the spout. Late Islamic. (See Fig. 4.51.)

C-64 Rim sherd of a jar. Common ware with chaff and grit temper. 12cm diameter. Buff ware.

Wet smoothed surfaces. Brown painted floral design on exterior. Wheel made. Late Islamic. Compare to C-267 and C-339. (See Fig. 4.51.)

C-65 Whole profile of a cup. Common ware with chaff and grit temper. 8cm diameter. Black ware with light orange surfaces. Interior wet smoothed. Dark orange paint on lip. Dark orange painted alternating horizontal lines and rows of dots on exterior. Perhaps hand made. Late Islamic. (See Fig. 4.51.)

4.2.35 S-56 Ceramics

Ceramics collected at the fortress that dominates site S-56 comprise the most distinctive assemblage of all of the MHAS sherds. Sherds collected here are made of an unusual ware (for the Wādī Ḥaḍramūt) and have decorations (particularly combed decorations) that were not found at any other site. Since this site is named for the Ḍofāri Ḥabūẓī family from al-Balīd that briefly conquered the Ḥaḍramūt in the 13th century,[17] I initially assumed that these sherds were imports from Oman. However, discussions with the current excavators of that site have convinced me that the ceramics collected at S-56 bear no resemblance to the Middle Islamic sherds from al-Balīd. The combed decoration does fit the description of "Trackware" from the Tihāma,[18] but there is no obvious reason to find a concentration of sherds from so remote a region in the middle of the Wādī Ḥaḍramūt.[19] Given the unlikeliness of these more exotic sources for the S-56 ceramics, it is most likely that Whitcomb's description of Early Islamic ceramics in the Wādī Ḥaḍramūt is accurate, and the sherds collected at S-56 by the MHAS are Early to Middle Islamic in date and local in origin.

C-108 Body sherd of a vessel of unknown type. Common ware with chaff temper. Grey core with light pink surfaces. Perhaps with a buff slip on the surfaces. Ropy design impressed into the

[17] Ibn Ḥamīd, 2003, pp. 506–507.

[18] Ciuk and Keall, 1996, No. 95/20a.

[19] The peculiarity, here, is not that we may be finding Tihāma wares in the interior Wādī Ḥaḍramūt, but that we only found them at one site in the MHAS survey. This contrasts with coastal Ḥaḍramūt, where Tihāma wares are much more common. (See, for example, Rougeulle, 2004, Fig. 12a.)

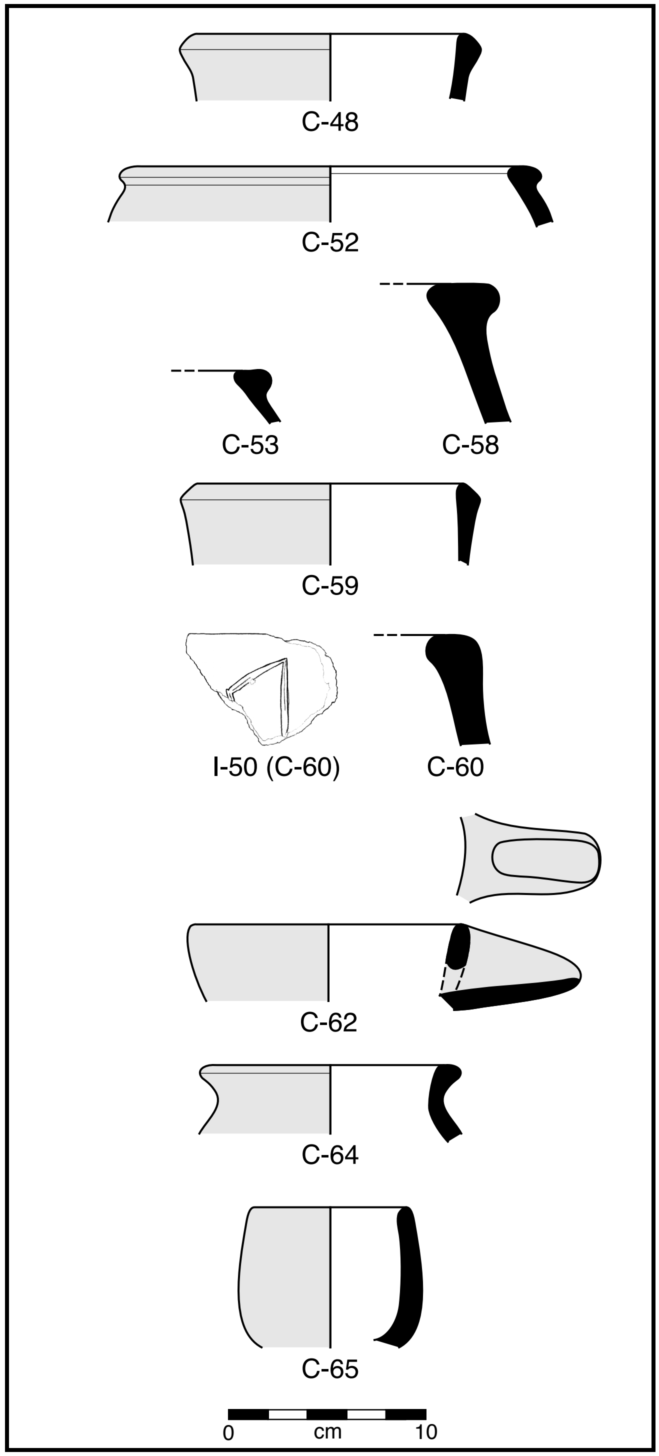

Figure 4.51: Sherds from site S-55.

Figure 4.52: Sherd C-51 from site S-55.

point of inflection on the exterior. Wheel made. Probably Islamic in date. (See Fig. 4.53.)

C-109 Rim sherd of a jar. Common ware with chaff and grit temper. 24cm diameter. Light orange core with buff surfaces. Wheel made. Probably Late Islamic in date. Compare to Whitcomb 1988, Fig. 15o. (See Fig. 4.54.)

C-111 Rim sherd of a jar. Common ware with chaff and sand temper. 16cm diameter. Buff ware. Combed horizontal band on exterior. Wheel made. Probably Islamic in date. (See Fig. 4.54.)

C-112 Body sherd of a vessel of uknown type. Common ware with sand temper. Small sherd. Buff ware. Turquoise glaze, with dark blue on exterior. Certainly an import. Possibly Middle Islamic in date. (See Fig. 4.53.)

C-113 Body sherd of a vessel of unknown type. Common ware with grit temper. Light salmon core with buff surfaces. Exterior has combed horizontal band and combed wavy line. Middle Islamic. (See Fig. 4.53.)

C-115 Rim sherd of a vessel of unknown type. Common ware with chaff temper. 30cm diameter. Light salmon core with buff surfaces. Wheel made. Middle Islamic. Compare to Whitcomb 1988, Fig. 27c. (See Fig. 4.54.)

C-117 Rim sherd of a jar. Common ware with chaff temper. 28cm diameter. Buff ware. Wheel made. Islamic in date. (See Fig. 4.54.)

C-119 Body sherd of a vessel of unknown type. Common ware with no visible temper. Buff ware. Interior wet smoothed. Elaborate combed and notched decoration on exterior. Wheel made. Possibly Middle Islamic. (See Fig. 4.53.)

C-120 Knob handle of a lid. Common ware with chaff temper. Black core, orange toward surfaces, with buff surfaces. Possibly Late Islamic. Compare to C-292, C-294, and Whitcomb 1988, Fig. 17p. (See Fig. 4.54.)

C-121 Rim sherd of a bowl. Common ware with grit temper. 18cm diameter. Buff ware with many dark orange inclusions, perhaps crushed pottery. Horizontal ridge on exterior, just below lip. Lightly incised wavy band below ridge. Wheel made. Early Islamic. Compare to Whitcomb 1988, Fig. 3d. (See Fig. 4.54.)

4.2.36 S-60 Ceramics

S-60 comprises one small stone structure, the architecture of which is crude and generic enough to elude easy attribution to any particular era. The single sherd collected there (C-122) is definitely Late Islamic in date.

C-122 Rim sherd of a Chinese porcelain cup. Rim diameter indeterminable. Blue and White Underglaze with red painted designs. Late Islamic (17th Century and later). Compare to C-23. (See Fig. 4.55.)

Figure 4.53: Sherds from S-56. *Top Row (L o R)*: C-108, C-112. *Bottom*: C-113, C-119.

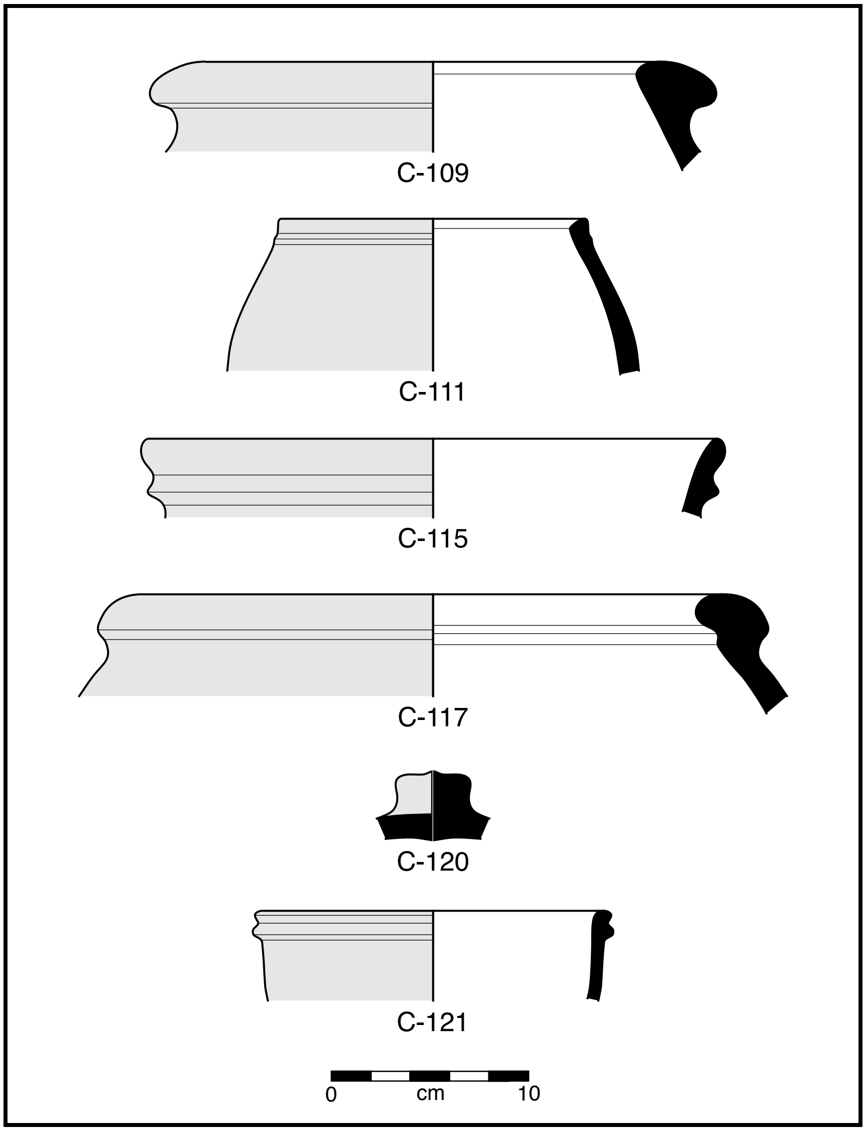

Figure 4.54: Sherds from site S-56.

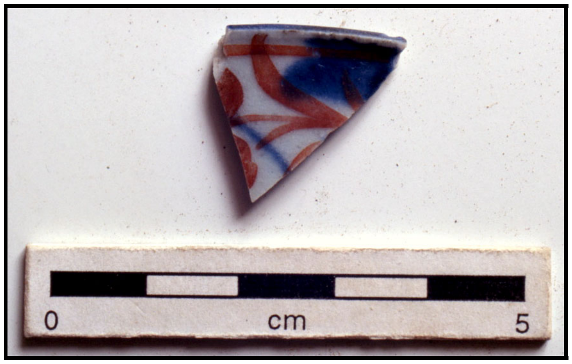

Figure 4.55: Sherd C-122 from site S-61.

4.2.37 S-61 Ceramics

Site S-61 is a recently abandoned castle or fortress, and the few sherds collected there are all clearly Late Islamic in date.

C-168 Rim sherd of a small jar. Common ware with grit temper. 6cm diameter. Black ware with buff surfaces. Brown painted herringbone and net patterns on exterior. Late Islamic. Compare to C-248, C-268, and C-301. (See Fig. 4.56.)

C-169 Body sherd of a vessel of unknown type. Common ware with grit and sand temper. Orange ware. Raised and notched horizontal ridge on exterior. Late Islamic. Compare to C-95, C-142, C-214, C-225, C-311, and Whitcomb 1988, Figs. 13m and 18l. (See Fig. 4.57.)

C-170 Rim sherd of a bowl. Common ware with grit temper. 30cm diameter. Black ware with orange surfaces. Maroon paint on lip. Probably Late Islamic in date, based on the maroon paint. (See Fig. 4.56.)

4.2.38 S-64 Ceramics

Site S-64 is a relatively recently abandoned village. Though one Pre-Islamic inscription was found on the site, the architecture is clearly Late Islamic in date—as are the ceramics collected there.

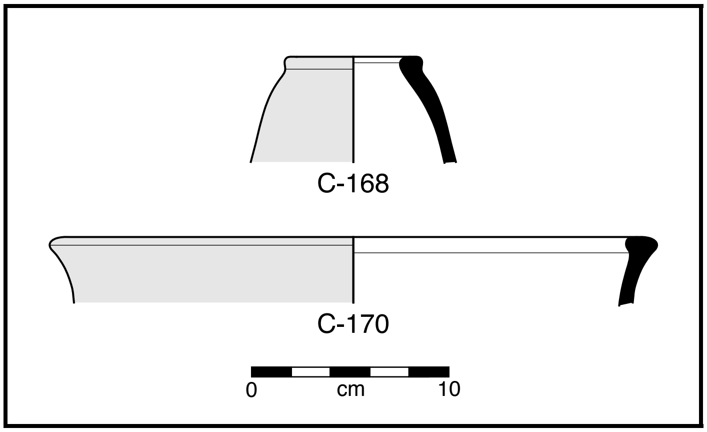

Figure 4.56: Sherds from site S-61.

Figure 4.57: Sherd C-169 from site S-61.

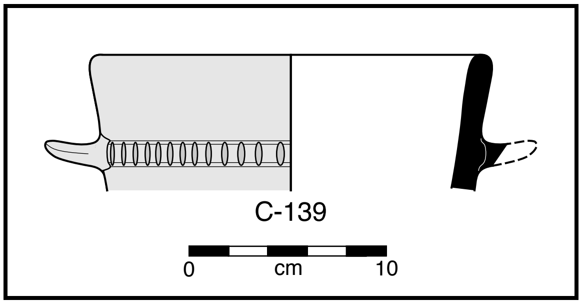

Figure 4.58: Sherd C-139 from site S-64.

Figure 4.59: Sherds from S-64. *L to R*: C-141, C-143, C-144

C-139 Rim sherd of a bowl. Common ware with chaff and grit temper. 20cm diameter. Raised and notched horizontal ridge, thickening to form a tab handle. Maroon core with orange surfaces. Exterior blackened by fire. Wheel made. Wet smoothed. Late Islamic. Compare to C-57, C-88, C-90, C-127, C-391, and Whitcomb 1988, Fig. 13m. (See Fig. 4.58.)

C-141 Base sherd of a Chinese porcelain cup. Base diameter indeterminable. Blue and White Underglaze painted. Late Islamic. (See Fig. 4.59.)

C-143 Body sherd of a vessel of unknown type. Common ware with grit temper. Salmon core with orange exterior and maroon interior. Dark maroon painted bands on exterior surface. Late Islamic. (See Fig. 4.59.)

C-144 Body sherd of a vessel of unknown type. Common ware with chaff temper. Black core with buff surfaces. Maroon painted vegetal design on exterior surface. Late Islamic. (See Fig. 4.59.)

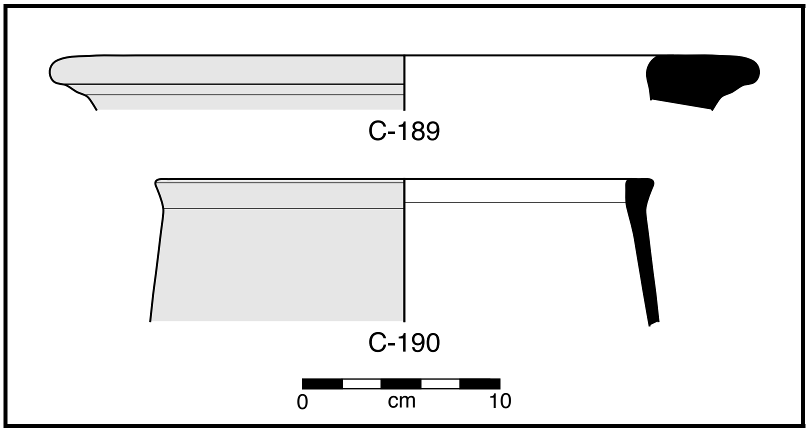

Figure 4.60: Sherds from site S-77.

4.2.39 S-77 Ceramics

The central feature of site S-77 is a large mud brick house (A-29). Though the surrounding structures appear to belong to various periods, the few sherds collected at this site are all Late Islamic in date. So too, presumably, is A-29.

C-189 Rim sherd of a jar. Common ware with chaff temper. 26cm diameter. Light pink ware. Wheel made. Maroon slip on interior surface. Late Islamic. Compare to C-220, C-234, C-372, and Whitcomb 1988, Fig. 17c. (See Fig. 4.60.)

C-190 Rim sherd of a bowl. Common ware with grit temper. 24cm diameter. Black ware with salmon surfaces. Wheel made. Possibly Late Islamic in date. Compare to C-183. (See Fig. 4.60.)

C-191 Body sherd of a vessel of unknown type. Coarse ware with grit temper. 30cm diameter at outer edge. Wheel made. Vertical and horizontal notched ridges. Late Islamic. Compare to C-14, C-25, and C-87. (See Fig. 4.61.)

Figure 4.61: Sherd C-191 from site S-77.

4.2.40 S-78 Ceramics

Though site S-78 is partially destroyed by a modern unpaved road, the structures there are clearly Pre-Islamic in date. A small settlement, perhaps including a temple, ceramics collected at this site are Pre-Islamic and bear a great resemblance to those found in the excavations at Jūjah.

C-3 Rim and tab handle of a bowl. Stoneware with grit temper. 28cm diameter. Grey ware. Wheel made. Inscribed with the Musnad characters 𐩥𐩵𐩣 (W D M ; I-47) on the upper surface of the handle.[20] Pre-Islamic (Jūjah Level IV; Raybūn ER-III to LR-I). Compare to Caton-Thompson 1944, Type IX, Hansen *et al.* 2004, Fig. 26.8, Sedov 1995a, Fig. 5.1, and Sedov 1998, Type 4.0 (inscribed in LR-I). (See Fig. 4.62.)

C-71 Base sherd of a vessel of unknown type. Common ware with grit temper. 15cm diameter base. Grey ware with brown interior. Interior wet smoothed. Wheel made. Pre-Islamic in date. (See Fig. 4.63.)

C-72 Base sherd of a vessel of unknown type. Common ware with grit temper. 16cm diameter. Maroon ware. Wheel made. Pre-Islamic in date. Compare to C-39, C-47, C-193, C-197,

[20] W D M is an epithet of the god Wadd, not infrequently found inscribed on this type of pottery.

C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384, C-405, and Hansen *et al.* 2004, Figs. 30.1, 30.4, 30.5, 34.6, and 34.7. (See Fig. 4.63.)

C-74 Rim sherd of a bowl. Common ware with chaff and grit temper. 18cm diameter. Black core with orange surfaces. Wheel made. Probably Pre-Islamic in date. (See Fig. 4.63.)

C-75 Rim sherd of a jar. Common ware with chaff and grit temper. 16cm diameter. Black ware with red exterior. Wheel made. Joins with C-80. Pre-Islamic (Jūjah Levels IV to III). Compare to C-40, C-80, C-205, C-324, C-330, C-364, C-366, and Hansen *et al.* 2004, Figs. 27.1–4 and 31.1–8. (See Fig. 4.63.)

C-78 Rim sherd of a jar. Common ware with chaff temper. 14cm diameter. Black ware with maroon surfaces. Wheel made. Pre-Islamic (Jūjah Level IV). Compare to C-44 and Hansen *et al.* 2004, Fig. 27.1. (See Fig. 4.63.)

C-81 Rim sherd of a bowl. Stoneware with grit temper. 26cm diameter. Black ware. Possibly from the same vessel as C-79. Pre-Islamic in date. (See Fig. 4.63.)

C-82 Rim sherd of a jar. Common ware with chaff and grit temper. 28cm diameter. Black ware with orange exterior. Interior wet smoothed. Wheel made. Pre-Islamic (Raybūn ER-II to MR-I). Compare to C-97, C-105, C-106, C-192, C-199, C-202, C-361, and Sedov 1998, Type 2.0 (ER-II to MR-I). (See Fig. 4.63.)

C-83 Rim sherd of a bowl. Common ware with chaff and grit temper. 32cm diameter. Black core with red surfaces. Interior wet smoothed. Incised horizontal line on exterior, just below rim. Wheel made. Pre-Islamic (Jūjah Level V). Compare to C-363 and Hansen *et al.* 2004, Figs. 23.8, 23.9, 23.11, 23.12, 24.4, 24.6, and 24.7. (See Fig. 4.63.)

C-102 Rim sherd of a bowl. Common ware with chaff and grit temper. Rim diameter indeterminable. Light pink ware. Interior wet smoothed. Wheel made. Pre-Islamic (Jūjah Levels IV to I). Compare to C-5, C-8, C-201, C-203, C-206, C-325, C-328, C-390, and Hansen *et al.* 2004, Figs. .1–6, 28.5–9, 32.1–3, and 35.3–8. (See Fig. 4.63.)

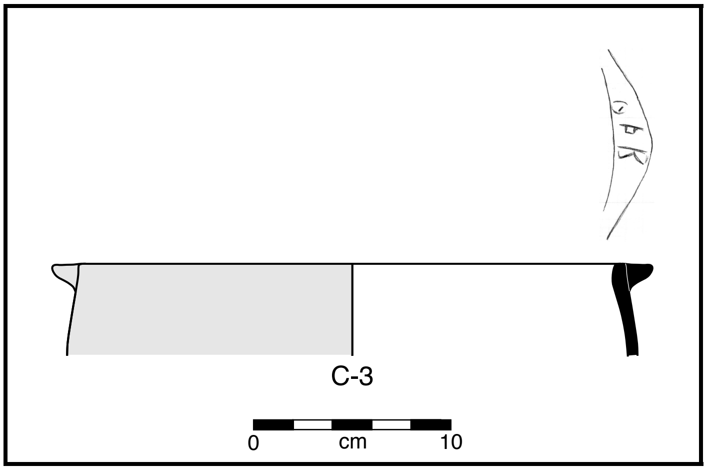

Figure 4.62: Sherd C-3 from site S-78, showing inscription I-47 which reads 𐩥𐩵𐩣 (W D M).

4.2.41 S-83 Ceramics

Site S-83 is apparently actually two sites. The first, a few fragmentary houses, perhaps the remains of a Pre-Islamic village, are mostly destroyed by modern fields at the southern edge of the site. The later settlement, a much later village, contains numerous moderately well-preserved structures, most of which are clustered around a mosque. Sherds collected in and around the later structures are clearly Islamic in date, and in some cases readily identifiable as Late Islamic. Not surprisingly, given the type of site, utilitarian wares (including those used in food preparation and serving) predominate.

C-391 Body sherd of a bowl with handle. Common ware with grit temper. 22cm diameter at midsection of sherd. Orange ware. Horizontal triangular notched tab handle. Interior wet smoothed. Wheel made. From the Islamic portion of the site. Late Islamic. Compare to C-57, C-88, C-90, C-127, C-139, and Whitcomb 1988, Fig. 13m. (See Fig. 4.64.)

C-392 Rim sherd of a bowl. Common ware with chaff and grit temper. 26cm diameter. Black core with light orange surfaces. Incised wavy line on exterior. Wheel made. From the Islamic portion of the site, but possibly Pre-Islamic in date. (See Fig. 4.64.)

C-393 Handle sherd of a vessel of unknown type. Common ware with grit temper. Loop handle.

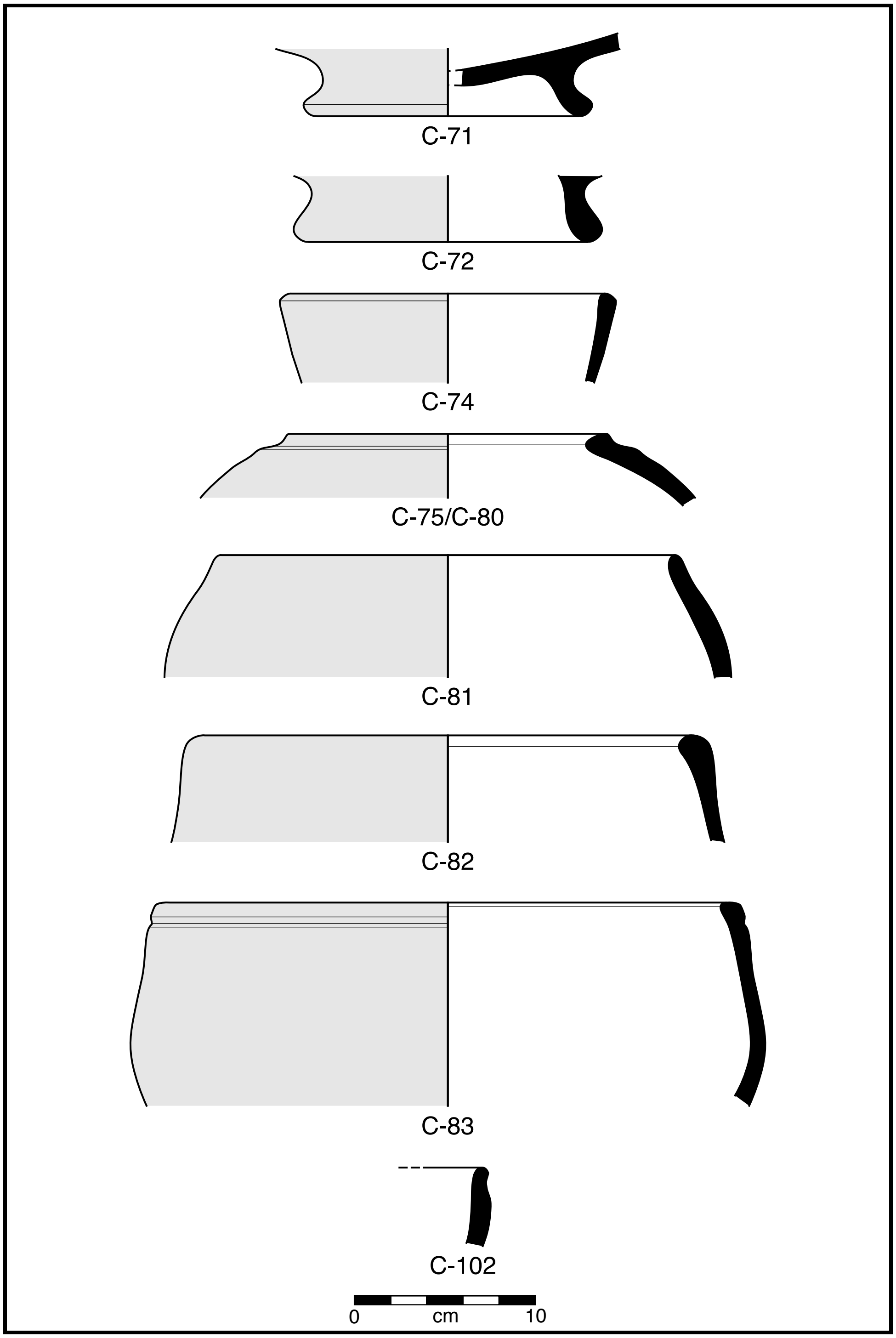

Figure 4.63: Sherds from site S-78. *T to B*: C-3, C-71, C-72, C-74, C-75/C-80, C-81, C-82, C-83, C-102.

Interior of the vessel wall is preserved at the handle's attachment point. Orange ware. From the Islamic portion of the site. Probably Islamic in date. (See Fig. 4.64.)

C-394 Rim sherd of a large bowl. Common ware with chaff temper. 28cm diameter. Black core with light salmon surfaces. Wet smoothed interior. From the Islamic portion of the site. Probably Islamic in date. (See Fig. 4.64.)

C-397 Handle sherd of a vessel of unknown type. Common ware with chaff temper. Fragment of a loop handle with a small, pointed, decorative lug. Black core with maroon surfaces. From the Islamic portion of the site. Islamic in date. (See Fig. 4.64.)

C-398 Rim sherd of a large jar. Coarse ware with chaff and grit temper. 32cm diameter. Black core and interior, with light orange exterior. Orange slip on exterior. Perhaps hand made. Lightly incised wavy line on exterior. From the Islamic portion of the site, but probably Pre-Islamic in date. Compare to Hansen *et al.* 2004, Fig. 35.2. (See Fig. 4.64.)

C-400 Rim sherd of a bowl. Common ware with chaff temper. 20cm diameter. Light orange ware. Dark orange slip on lip and upper portion of interior and exterior. From the Islamic portion of the site. Probably Late Islamic in date. (See Fig. 4.64.)

C-401 Body sherd of a vessel of unknown type. Common ware with chaff and grit temper. Grey core with black interior and light orange exterior. Dark orange painted bands and lines on exterior. From the Islamic portion of the site. Middle Islamic to Late Islamic in date. (See Fig. 4.64.)

C-403 Rim sherd of a plate or lid. Common ware with chaff and grit temper. 34cm diameter. Buff ware. Hand made. From the Islamic portion of the site. Probably Late Islamic in date. Compare to C-9, C-227, and C-402. (See Fig. 4.64.)

C-408 Rim sherd of a bowl. Common ware with grit temper. 30cm diameter. Black core with orange interior. Exterior fire clouded orange, maroon, and black. Wheel made. From the Pre-Islamic portion of the site. Probably Pre-Islamic in date. (See Fig. 4.64.)

Figure 4.64: Sherds from S-83. *Top Row (L to R)*: C-391, C-392, C-393. *Second Row*: C-394, C-397, C-398. *Third Row*: C-400, C-401, C-403. *Bottom*: C-408.

4.2.42 S-84 Ceramics

Site S-84 is the remains of an Islamic period lookout on the southern scree slope of the Wādī Ḥaḍramūt. The most readily identifiable sherds collected here are Late Islamic in date, but others appear earlier. A number of sherds collected at S-84 are also apparently Pre-Islamic in date, but these are presumably intrusions from the adjacent Pre-Islamic site S-23.

C-372 Rim sherd of a *zīr*. Common ware with chaff and grit temper. 32cm diameter. Black core, light pink toward the surfaces. Interior slipped brown. Exterior may have had a red slip. Incised wavy band on the exterior. Wheel made. Probably Late Islamic in date. Compare to C-189, C-220, and C-234. (See Fig. 4.65.)

C-373 Rim sherd of a large jar. Coarse ware with grit temper. Dense, almost a stoneware. Dark reddish-brown ware. Wet smoothed interior. Probably wheel made. Probably Pre-Islamic in date. (See Fig. 4.65.)

C-374 Base sherd of a cup. Common ware with grit temper. 14cm diameter at point where flat base meets vessel wall. Black core and interior, with orange exterior. Maroon painted band at point of inflection between wall and base. Black painted band on exterior. Probably hand made. Probably Late Islamic in date. Compare to C-273 and Whitcomb 1988, Fig. 13n. (See Fig. 4.65.)

C-377 Rim sherd and vessel wall of a bowl. Common ware with chaff and grit temper. 22cm diameter. Black core, orange toward surfaces. Interior slipped brown. Possibly hand made. Probably Pre-Islamic in date. (See Fig. 4.65.)

C-379 Base sherd of a vessel of unknown type. Common ware with chaff and grit temper. Diameter approximately 22cm. Light pink ware. Heavy, flat base. Possibly Middle Islamic. Compare to Whitcomb 1988, Fig. 6t. (See Fig. 4.65.)

C-382 Body sherd of a Chinese porcelain cup. Blue and White Underglaze painted geometric pattern on exterior. Probably from the same vessel as C-381, and possibly also C-383 (which

Figure 4.65: Sherds from S-84. *L to R*: C-372, C-373, C-374. *Bottom L*: C-377. *Bottom Center*: C-379. *Right Middle*: C-382. *Bottom Right*: C-383.

was found nearby). Late Islamic. (See Fig. 4.65.)

C-383 Body sherd of a Chinese porcelain cup. Blue and White Underglaze painted concentric rings on exterior and dot on interior. Possibly from the same vessel as C-381 or C-382. Late Islamic. (See Fig. 4.65.)

4.3 Decoration

Indigenous Pre-Islamic ceramics in the Wādī Ḥaḍramūt are largely undecorated, whereas Islamic ceramics carry various decorative schemes, modeled, applied, and painted. Decoration and surface treatment, therefore, serves as a ready chronological marker for Ḥaḍramī ceramics. Major decorative schemes are presented below:[21]

4.3.1 Painted Decoration

Crosshatching

Crosshatched lines, in brown or maroon paint, upon a buff background. Found only on the exterior of vessels, this is a major decorative scheme of the Late Islamic. Crosshatched regions are frequently framed by geometric forms such as lozenges and triangles. Examples of the former are seen in ceramics C-15/C-30/C-31, C-20, C-50, C-148, C-168, perhaps C-215, and C-216. Examples of the latter are seen in ceramics C-269, C-293, C-343, and perhaps C-63 and C-215. The triangles sometimes point upwards and sometimes downward, perhaps even on a single vessel. Horizontal bands of crosshatching, bounded above and below by painted lines, are found on ceramics C-242, C-254, C-269, C-272, and C-300. Ceramics C-62 and C-269 employ crosshatched designs in conjunction with lines of dots. (See Fig. 4.66.)

Horizontal Lines and Dots

Alternating horizontal bands of lines and dots, in brown or maroon paint, upon a buff background. Found only on the exterior surfaces of vessels. Frequently employed on Late Islamic wares. Noted on ceramics C-24, C-65, C-157, C-216, C-229, C-269, and C-337. (See Fig. 4.67.)

Racing Stripes

Parallel vertical lines and solid bands, in groups of three to five, painted in brown or maroon, on the exterior of the vessel. Mostly a Late Islamic decorative scheme, but perhaps beginning in the Middle Islamic period. Executed with lines of equal thickness on ceramics C-16/C-18, C-126, C-251, C-252/C-255, C-270, C-271, C-276, C-278, C-297, C-338, C-340, C-349, and C-401. Executed with thin lines flanking a thick band (always in maroon paint upon an orange ware) on ceramics C-29, C-89/C-92/C-96, and C-143. Interspersed with vertical lines of painted dots on

[21] Generally, because these motifs have do not have standard or "official" names in the literature, the names presented herein are my own designations. Sometimes fanciful or silly, similar light-hearted but evocative naming is nevertheless also employed by others (e.g., Mason and Keall, 1988, p. 453).

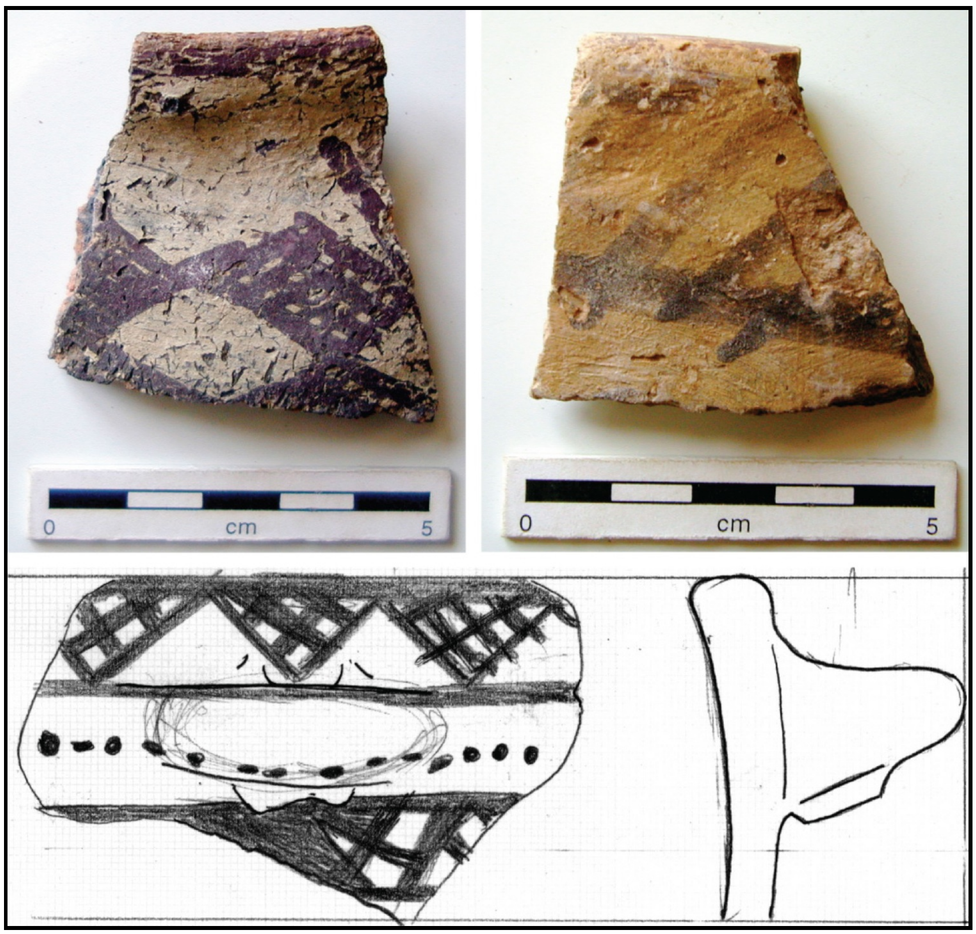

Figure 4.66: Examples of crosshatching decoration (not to scale). C-15 (*top left*), C-63 (*top right*), C-269 (*bottom*).

Figure 4.67: Example of Horizontal Lines and Dots decoration on sherd C-24.

ceramics C-161 and C-177, both of which are sherds of bottle necks.[22] (See Fig. 4.68.)

Vegetation

Vertical stalks of leafy vegetation, in brown or maroon paint, adorn the exterior of ceramics C-64, C-144, C-168, C-248, C-267, C-268, C-280, C-301, and C-339. The decoration of C-22 may also be vegetal—and, if it is applied vertically (rather than horizontally, as it is photographed), could be included in this group. Found primarily on Late Islamic ceramics. (See Fig. 4.69.)

Zig Zag

A single painted zig zag line runs horizontally below the rims of two bowls from S-5, C-217 and C-244. Though simple, this painted decoration does not appear to have been used in the Pre-Islamic period. (See Fig 4.70.)

[22] In addition to these sherds, another Racing Stripes painted sherd was collected as part of bag B-19 from site S-13, but never cataloged.

Figure 4.68: Examples of Racing Stripes decoration. *T to B:* C-126, C-89 & C-96, and C-177.

Figure 4.69: Example of Vegetal decoration on sherd C-168.

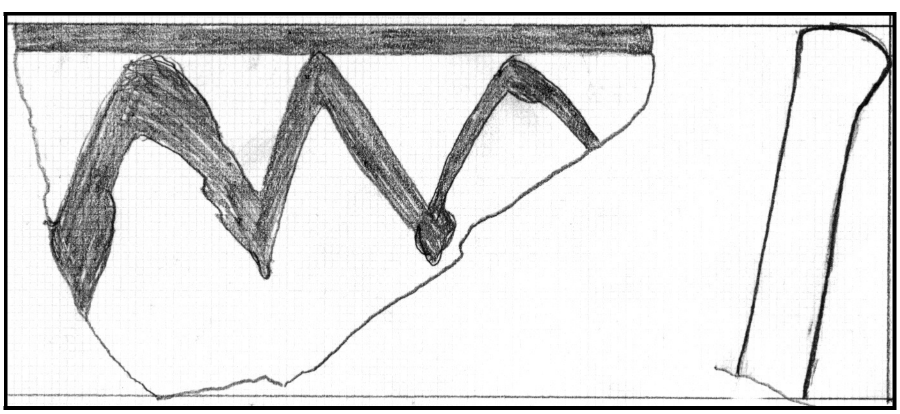

Figure 4.70: Example of painted Zig Zag decoration on sherd C-244.

Figure 4.71: Example of Brown Slip on sherd C-58.

4.3.2 Slips and Glazes

Brown Slip

Brown slip applied to the exteriors of ceramics C-58, C-91, C-163, C-171, C-188, C-211, C-220, C-238, C-307, C-309, C-310, C-372, C-376, C-377, and C-389. Sometimes, this slip is a thin wash, whereas in other examples it has been applied heavily enough to now fall away in large flakes. Found only on Islamic period sherds. (See Fig. 4.71.)

Blue and White Underglaze

Chinese Blue and White Underglaze painted porcelain cups and bowls. Various tones of blue paint are found on sherds C-17/C-21, C-19, C-23, C-55, C-56, C-122, C-125, C-132, C-141, C-149, C-150, C-151, C-172, C-173, C-175, C-176, C-178/C-180, C-184, C-185, C-186, C-187, C-232, C-233, C-275, C-295, C-303, C-323, C-336, C-341, C-342, C-347, C-381/C-382, and

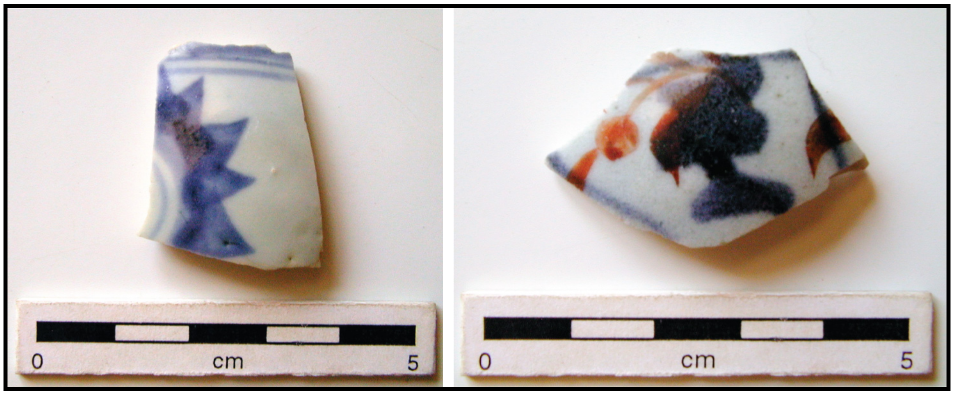

Figure 4.72: Examples of Blue and White Underglaze painted porcelains. C-19 (*left*) shows the "chrysanthemum" design discussed above. C-23 (*right*) shows red and blue paint.

C-383. Also with red underglaze painting on sherds C-23 and C-122.[23] A number of different vegetal and geometric designs are evidenced in this corpus. Sherds C-19, C-341 and C-342 all have a distinctive floral motif, identified elsewhere as a "chrysanthemum," but perhaps a stylized lotus, judging by its pointed petals.[24] Blue and White Underglaze painted porcelains were not manufactured before the mid 14th century in China,[25] and red paint was not perfected until the 17th century[26]—so these ceramics, in the Wādī Ḥaḍramūt, are a reliable marker for the Late Islamic period, though some of the earliest examples may have been imported in the 14th or 15th centuries. (See Fig. 4.72.)

Greenish Glazes

There is a heavy transparent green glaze on the exterior surface of sherd C-6. C-112 and C-146 have traces of blue paint beneath thin transparent turquoise glaze on their exterior surfaces. Owing to the small size of these sherds, little else can be said about them. Their small size compounds the general difficulty in fixing the origin or age of greenish glazed ceramics—which, though probably

[23] In addition to these Blue and White Underglaze glazed sherds, three examples were collected as part of bag B-19 from site S-13, but never cataloged. Two of these three sherds also have red underglaze painting.

[24] See n. 13, above.

[25] Carswell, 1985, p. 27.

[26] Macintosh, 1986, p. 1.

Figure 4.73: Examples of Greenish Glazed sherds. *L to R:* C-6, C-112, and C-146.

Figure 4.74: Examples of thin mustard glaze on two sherds (C-344 and C-345, probably from the same vessel, from site S-46).

Early Islamic, have a wide distribution both temporally and geographically.[27] (See Fig. 4.73.)

Mottled Mustard Glaze

Thin mottled mustard colored glaze on the exterior surfaces of two sherds (C-344 and C-345), which probably come from the same vessel. No good comparanda were found for these sherds, but they are similar in ware and glaze to Fehérvári 2000, No. 10, a bowl which is dated stylistically to the 7th or 8th centuries. (See Fig. 4.74.)

[27] Watson, 2004, p. 157; In addition to these three sherds, an additional example of a greenish glazed sherd was collected as part of bag B-22 from site S-14, but never cataloged.

Figure 4.75: Examples of Notched Horizontal Ridge decoration. *L to R:* C-169, C-90 (with notches running from ridge along edge of Triangular Tab Handle), and C-298.

4.3.3 Modeled and Applied Decoration

Notched Horizontal Ridge

A horizontal ridge, rectangular in cross-section, notched at regular intervals, and encircling the perimeter of the vessel. This decoration, though simple, is only attested on Islamic period ceramics in the Wādī Ḥaḍramūt. Found in its simplest form on ceramics C-95, C-142, C-169, C-191, C-214, and C-297. On ceramics C-57, C-88, C-90, C-127, C-139, and C-391, the ridge is thickened in places to form tab handles protruding directly outward from the vessel wall, triangular in top view, and with the notching continuing around their outermost edges. Ceramics C-225 and C-311 find the notched horizontal ridge interrupted by small rectangular lug handles.[28] Sherd C-298, however, sports multiple parallel ridges, lending it a corrugated appearance that distinguishes it from the other examples of Notched Horizontal Ridge decoration (to which it is nevertheless clearly related). (See Fig. 4.75.)

Indented Vertical Tapering Bead

A vertically applied bead, tapering upwards, with regularly spaced indentations on its outer edge. This bead runs toward a thickened rim (C-87) or a Notched Horizontal Ridge (C-191), or it ends at the vessel's otherwise unadorned lip (C-14/C-25).[29] This decoration is only found among Islamic

[28] On a given vessel, between handles of either type, only the "simplest" form of Notched Horizontal Ridge decoration is present, with no indication of the vessel's handle type. Thus, one or the other of these handle forms may have been originally present on the sherds listed above as the "simplest" form, but not recorded as such due to the accidents of preservation and recovery.

[29] In addition to these four sherds, a fifth example of Intended Vertical Tapering Bead was collected as part of bag B-19 from site S-13, but never cataloged.

Figure 4.76: Examples of Indented Vertical Tapering Beads. C-87 (*left*), C-25 (*right*).

period ceramics. (See Fig. 4.76.)

Incised Wavy Line

Usually a single line ringing the vessel a few centimeters below the rim or below a ridge (if the vessel is so adorned). Occasionally, a single vessel has two or more wavy lines, at varying heights along its wall. The execution of these lines is generally haphazard, of varying depth, and with varying height and width of the waveform's peaks and troughs. On some sherds, the wavy line is cut with a tool, and on others it is apparently made with the backside of the potter's fingernail. Found on ceramics C-2, C-32, C-34, C-35, C-37, C-40, C-41, C-45, C-54, C-58, C-85, C-107, C-113, C-116, C-121, C-133, C-204, C-208, C-211, C-218, C-220, C-222, C-246, C-265, C-266, C-309, C-310, C-330, C-371, C-372, C-385, C-392, and C-398, this decorative scheme is found on Pre-Islamic and Islamic period sherds alike. (See Fig. 4.77.)

Triangular Tab Handle

A small handle, triangular in top view, projecting directly outward from the vessel wall. This may actually be a variant of the handles found on some of the "Notched Horizontal Ridge" decorated sherds (see 4.3.3), but lacking the notching on their outer edge. Found on ceramics C-51 and C-69.[30] Paint on C-69 and other associated finds identify Triangular Tab Handles as Islamic in date. (See Fig. 4.78.)

[30] In addition to these two sherds, an additional example of a Triangular Tab Handle sherd was collected as part of bag B-20 from site S-13, but never cataloged.

Figure 4.77: Examples of Incised Wavy Lines. *Top row, L to R:* C-2, C-45, and C-58. *Bottom row, L to R:* C-133, C-371, and C-385.

Figure 4.78: Example of a Triangular Tab Handle on sherd C-69.

Figure 4.79: Examples of Combed decoration on three sherds from S-56. *L to R:* C-111, C-116, and C-119.

Combed

Only a handful of sherds collected by the MHAS have combed decoration. Most of these sherds were collected at site S-56. There is, however, no common pattern in combed decorations (beyond their technical execution) among the S-56 sherds or the combed sherds from other sites. The nearest parallels to these sherds are examples, particularly of "Trackware," from the Tihāma—but their identification as such would require comparative study. Designs include horizontal bands, wavy lines, and crosshatching. Found on ceramics C-111, C-113, C-116, C-119, C-266, C-277, and C-282. Whitcomb dates combed decoration on ceramics of the Wādī Ḥaḍramūt to the Early Islamic period.[31] (See Fig. 4.79.)

Impressed Patterns

Punctile decorative patterns formed by pressing a stylus into the outer walls of the vessel's still damp clay. Found on ceramics C-274 and C-299. The execution of C-274's decoration is reminiscent of, and perhaps imitative of the "Horizontal Lines and Dots" scheme—and, if so, would date to the Late Islamic period. (See Fig. 4.80.)

Gridded Interior

Two heavy, thick-walled sherds from S-46 (C-355 and C-356) sport crosshatching on their interior surfaces, cut into a diamond pattern grid with a tool when the clay was still wet. Though here

[31] Whitcomb, 1988, pp. 181–182.

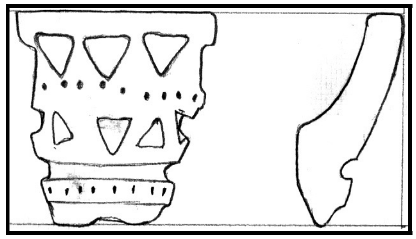

Figure 4.80: Example of Impressed decoration on sherd C-299.

listed among decorative schemes, the effect of this gridding is apparently functional, as if for the preparation of dairy or other products that depend in part upon a large evaporative or absorptive surface. Perfect analogues of these sherds were found by SoYCE on a number of sites, and are dated to the ER I phase at Raybūn.[32] (See Fig. 4.81.)

4.4 Vessel Forms and Types

As opposed to the wide variety of apparently meaningful decorations among the corpus of MHAS ceramics (many of which appear on multiple vessel types), most formal variations, in isolation, are not so broadly diagnostic of temporal distinctions (or stylistic trends). However, where preserved in sufficient detail, sherds with distinctively shaped components—rims, bases, etc.—are frequently recognizable as individual facets of suites of traits that *in toto* comprise specific vessel types. Thus, certain distinct formal characteristics, rather than being shared across multiple types of vessels from a given time or place, can still stand proxy for particular vessel types. These formal elements—regardless of whether they are shared among multiple vessel types or simply component features found always in association with other distinctive features of particular vessel types—are discussed below.

4.4.1 Coffee Roasters

These pans have short, heavy handles which terminate in disks pierced vertically (perhaps for hanging on wooden pegs). The pans' interiors are burnished—presumably a functional finish.

[32] Sedov, 1996a, Fig. 21.4.

Figure 4.81: Example Gridded Interior treatment of sherd C-355.

Tufnell gives the modern name of this vessel as *miḥmās*,[33] and Posey shows an example that is similar to but more highly elaborated than C-131 or C-231.[34] Coffee was not consumed in the Ḥaḍramūt until at least the 15th century[35]— so these sherds are probably Late Islamic in date. (See Fig. 4.82.)

4.4.2 "Flower Vases"

These are small jars with a teardrop profile and painted vegetal designs on their exteriors. (I call these "Flower Vases" merely because their size, shape and decoration are evocative of modern flower vases, and not any actual inferred function.) The bodies of C-168, C-248, C-268, and C-301 are surmounted with hole mouths with flattened rims, whereas C-64, C-267, and C-339

[33] Tufnell, 1961, p. 34.

[34] Posey, 1994, Cat. 131. In addition to these two sherds from the MHAS corpus, an additional example of a *miḥmās* sherd was collected as part of bag B-17 from site S-13, but never cataloged.

[35] Serjeant, 1962, p. 259; Mason and Keall, 1988, p. 463.

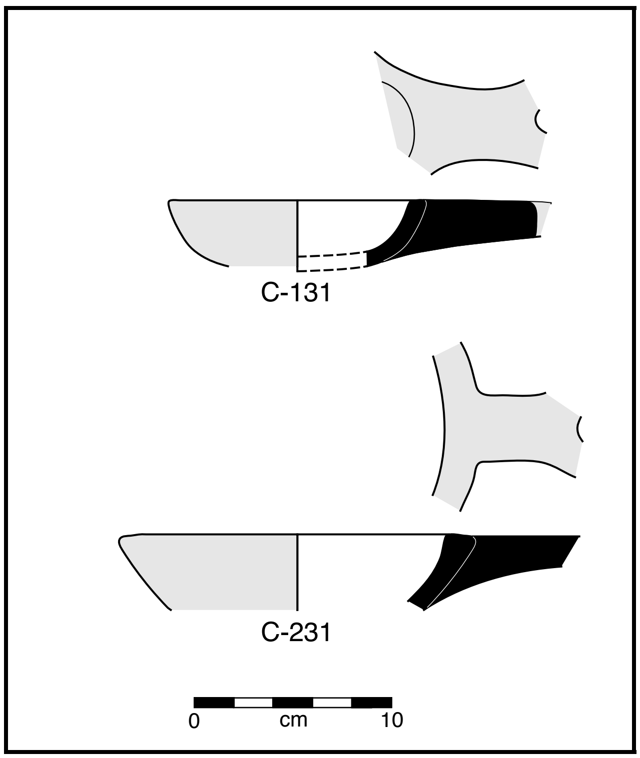

Figure 4.82: Examples of Coffee Roasters.

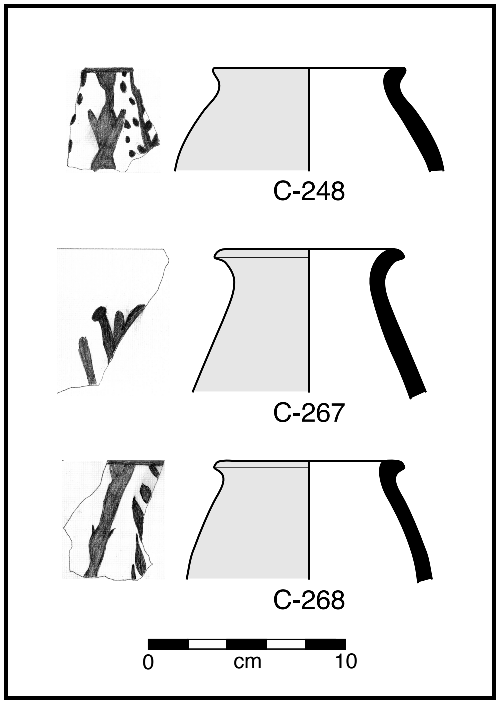

Figure 4.83: Examples of "Flower Vases."

constrict to form short necks before opening again into everted rims.[36] This vessel type belongs to the Late Islamic period. (See Fig. 4.83.)

4.4.3 Large Storage Jars (*Ziyār*)

On sites of both the Pre-Islamic and Islamic periods, fragments of large, heavy, coarse ware storage jars are commonly found. These vessels, *ziyār* (s. *zīr*), were in fact used for household water storage into the modern era—so their presence on archaeological sites as well is unsurprising. Despite a fairly wide variety of rim shapes, vessel sizes, decorative schemes, and ware densities, a few patterns can be seen.

[36] In addition to these sherds, another example of a Flower Vase sherd was also collected as part of bag B-19 from site S-13, but never cataloged. Also, an example from the excavations at aš-Šiḥr (Hardy-Guilbert and Ducatez, 2004, Fig. 18.9), though more globular than the teardrop shapes found in the MHAS survey, clearly belongs to the same tradition.

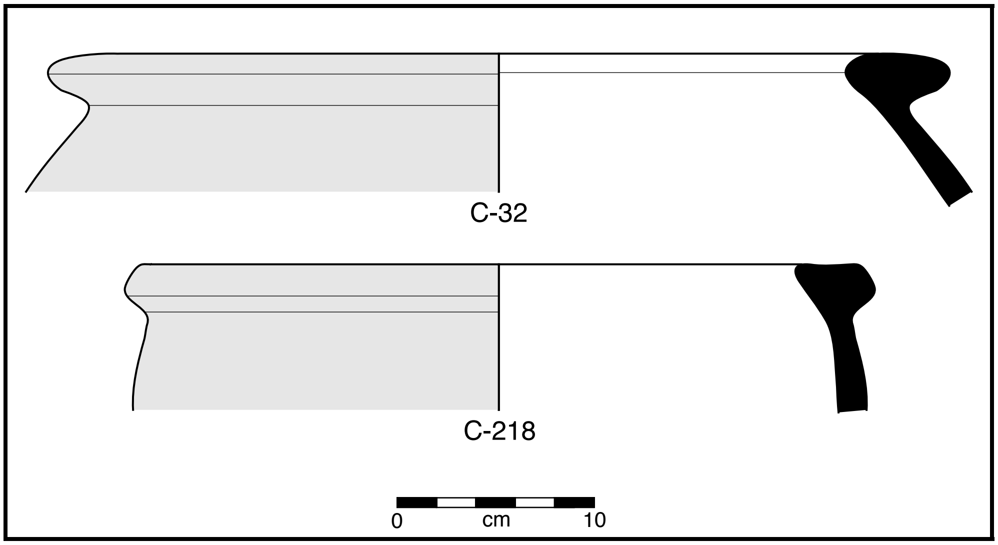

Figure 4.84: Examples of *Ziyār* with External Ledge Rims. C-32 has a rounded rim, and C-218 has a squared rim.

Ziyār with External Ledge Rims

These are sherds from large vessels. All are slipped, usually heavily and usually brown, and most have wavy horizontal bands incised into their exterior surface below the rim. The thickening of their rims forms a horizontal ledge that protrudes outward, but never inward (as opposed to the ledge rims on many clearly Pre-Islamic *ziyār*.) The outer edge of the ledge on sherds C-32, C-58, C-307, C-309, and possibly C-310 is rounded, whereas on sherds C-35, C-70, C-211, and C-218 it is squared. Whether there is any meaningful difference between the rounded and squared rim profiles, however, is unknown.[37] (See Fig. 4.84.)

Ziyār with Stepped Ledge Rims

These vessels have a ledge rim, thickened exteriorly, with a stepped profile below their overhanging outermost edge. The upper surfaces of the rims of C-189 and C-234 are both flat, whereas the upper edge of C-220 and C-372 are both angled (higher toward the vessel interior, lower toward its exterior). Other than the difference in the angle of the uppermost surface, however, these four

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[37] In addition to these sherds, an additional example of a rounded External Ledge Rim *Zīr* sherd was collected as part of bag B-17 from site S-13, but never cataloged.

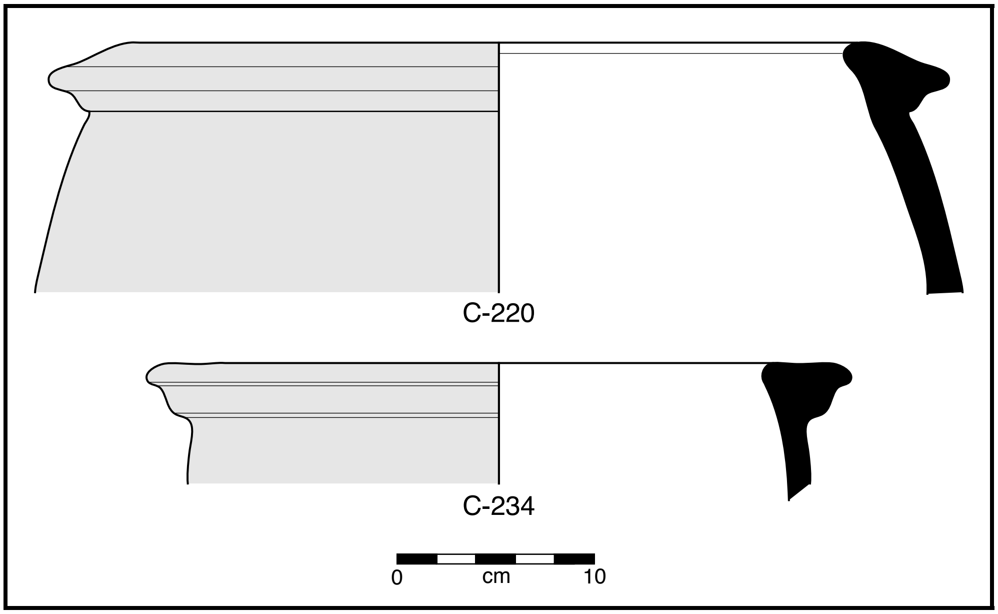

Figure 4.85: Examples of *Ziyār* with Stepped Ledge Rims.

sherds are quite similar. These sherds are Middle Islamic to Late Islamic in date. (See Fig. 4.85.)

Inscribed *Ziyār*

C-1 and C-2, both from site S-23 are inscribed with Musnad characters on the upper surface of their ledge rims. Such inscriptions are commonly found on Pre-Islamic *ziyār*, but are unattested on Islamic examples. (See Fig. 4.16, above.)

4.4.4 Notched Handle Stoneware Bowls

Very similar to the Tab Handle Stoneware Bowl (see Subsection 4.4.13, below) in size, shape, and ware, the handles on these vessels, rather than protruding directly from the vessels' rims, are attached to their walls lower down. These handles—the vessels' most distinctive features—are small oval lumps with multiple vertical notches on their outermost edges. C-10, C-12, and C-13 (probably all from the same vessel) are the only example of this Pre-Islamic type of bowl in the MHAS corpus. (See C-12 in Fig. 4.34, above.)

4.4.5 Pre-Islamic-Style Bowls with Plain Rims

C-5, C-8, C-102, C-201, C-203, C-206, C-325, C-328, and C-390 are all sherds of large, hemispherical, unadorned bowls from the Pre-Islamic period. (See Fig. 4.86.)

4.4.6 Pre-Islamic-Style Grooved Carinated Bowls

C-83 and C-363 both belong to a common type of Pre-Islamic bowl with which has a single incised groove cut into its outer face below the rim. The carination is a distinct point of inflection near the bottom of the vessel, where its vertical wall tucks inward toward the vessel's base. (See C-83 in Fig. 4.63, above.)

4.4.7 Pre-Islamic-Style Hole Mouth Jars

C-40, C-75, C-80, C-205, C-324, C-330, C-364, and C-366 are all sherds of globular vessels with hole mouths. The rims of these vessels are sometimes upturned, and usually slightly thickened exteriorly to form a lip around the vessel opening. Vessels of this type are found with great frequency on Pre-Islamic sites in Ḥaḍramūt such as Ḥurayḍah, Raybūn, and Jūjah. (See Fig. 4.87.)

4.4.8 Pre-Islamic-Style Large Open Jars with Curved Walls

C-37, C-195, C-326, C-329, C-350, C-351, C-368, and C-371 are all fragments of large pear shaped vessels with open tops and simple rims, which Sedov classifies as Raybūn Type 2.1.[38] C-37 and C-371 are also decorated with incised wavy lines on their exterior surfaces. (See Fig. 4.88.)

4.4.9 Pre-Islamic-Style Large Open Jars with Straight Walls

Very similar to the above type, C-82, C-97, C-105, C-106, C-192, C-199, C-202, C-361, and perhaps C-354 are all fragments of unadorned pear shaped open jars. The distinction between

[38] Sedov, 1998.

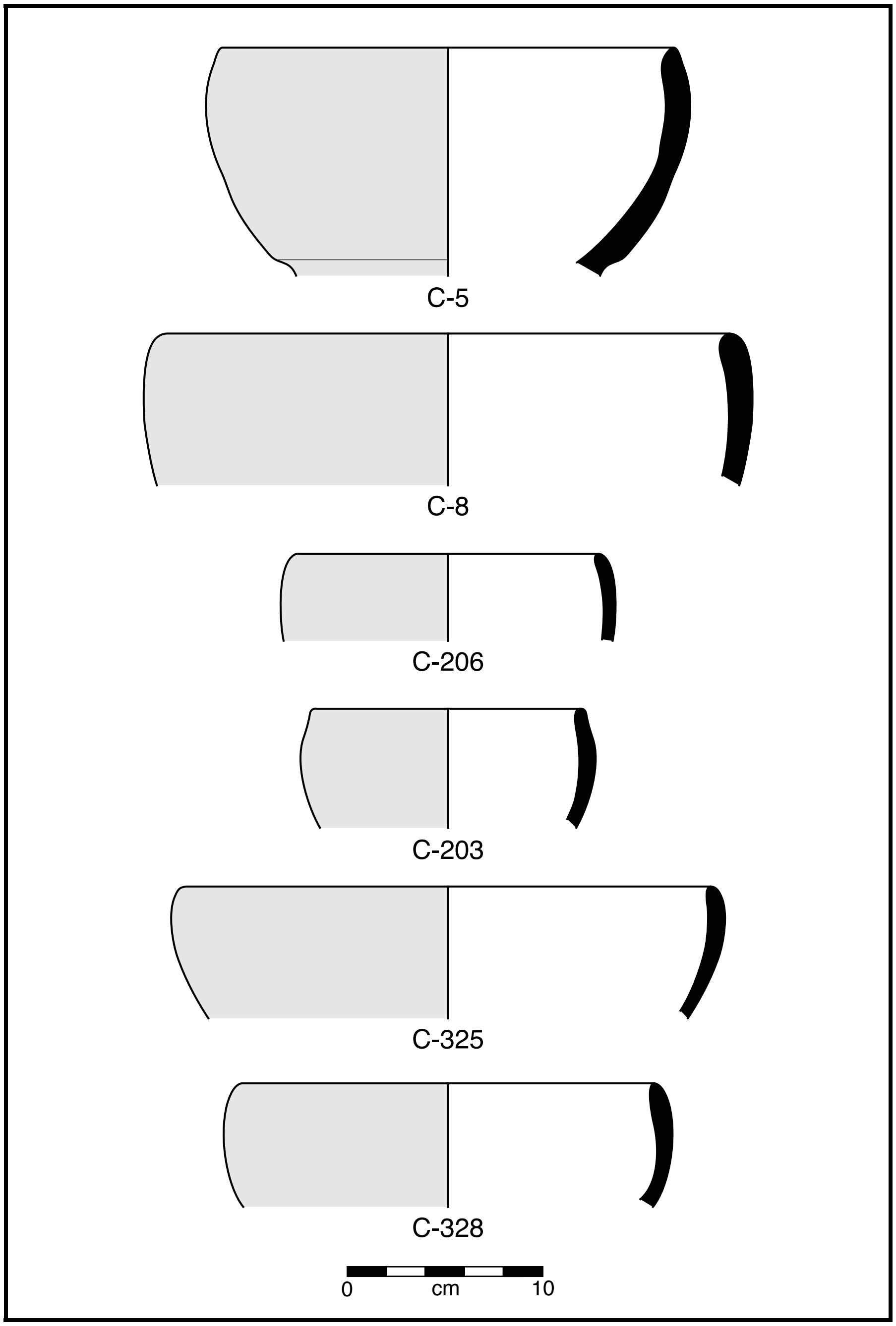

Figure 4.86: Examples of Pre-Islamic-Style Bowls with Plain Rims.

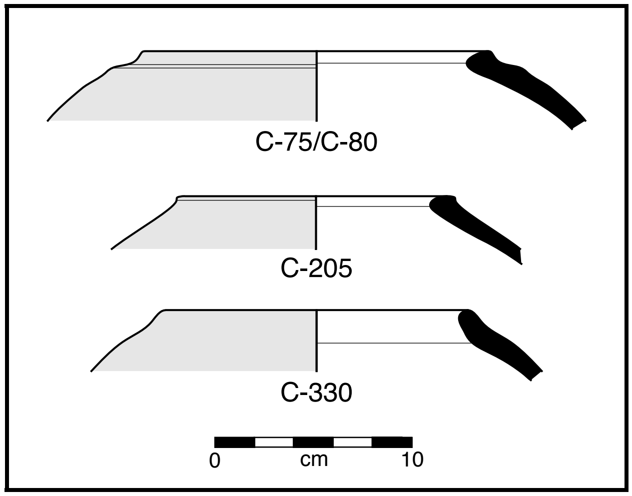

Figure 4.87: Examples of Pre-Islamic-Style Hole Mouth Jars.

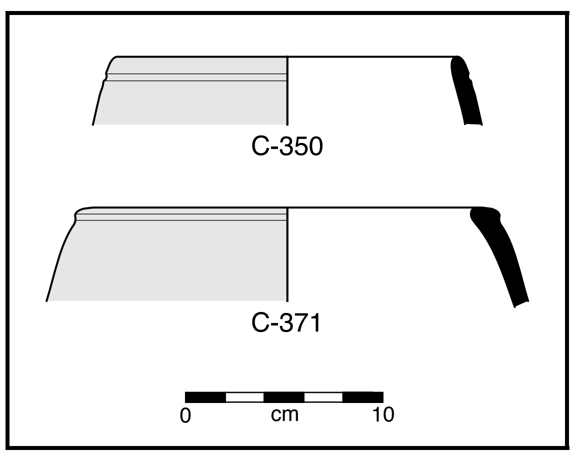

Figure 4.88: Examples of Pre-Islamic-Style Large Open Jars with Curved Walls.

their straight walls and the above curved walls, however, is enough to warrant a new designation (Type 2.0) in Sedov's typology. (See Fig. 4.89.)

4.4.10 Pre-Islamic-Style Ring Bases

C-39, C-47, C-72, C-193, C-197, C-308, C-317, C-318, C-327, C-331, C-357, C-358, C-369, C-370, C-384 all C-405 are ring bases (or fragments thereof) of vessels of the Pre-Islamic period. These ring bases are characterized by their moderate height (elevating the vessel bottom entirely), outward flare, and rounded feet. Most typically, these bases were found on globular or pear-shaped jars. C-42 is a variant, sufficiently tall to be considered a pedestal base. (See Fig. 4.90.)

4.4.11 Raybūn Type 2.0b Jars

C-11, C-98, and C-101 are all sherds from Raybūn Type 2.0b vessels.[39] Large jars, these are closed forms with short necks and simple rounded rims. (See Fig. 4.91.)

4.4.12 Rectangular Lug Handle Bowls

C-225 and C-311 are sherds from small, and presumbly shallow, bowls. These bowls have straight walls, square lug handles part way up their walls, and a raised, notched ridge circling their bodies, interrupted by the handles.[40] (See Fig. 4.92.)

4.4.13 Tab Handle Stoneware Bowls

This is one of the most distinctive Pre-Islamic vessel forms in the Wādī Ḥaḍramūt. Always constructed of a dense grey stoneware, these are hemispheric bowls with two or more small tab handles, usually protruding horizontally from their rims. Frequently, too, these handles or the vessel bodies are inscribed with Musnad characters. C-3 is the only such example from the MHAS corpus. The frequency with which sherds of this vessel type were found near the Level III temple

[39] Sedov, 1998.

[40] In addition to these two sherds, a third example of Rectangular Lug Handle Bowl was collected as part of bag B-19 from site S-13, but never cataloged.

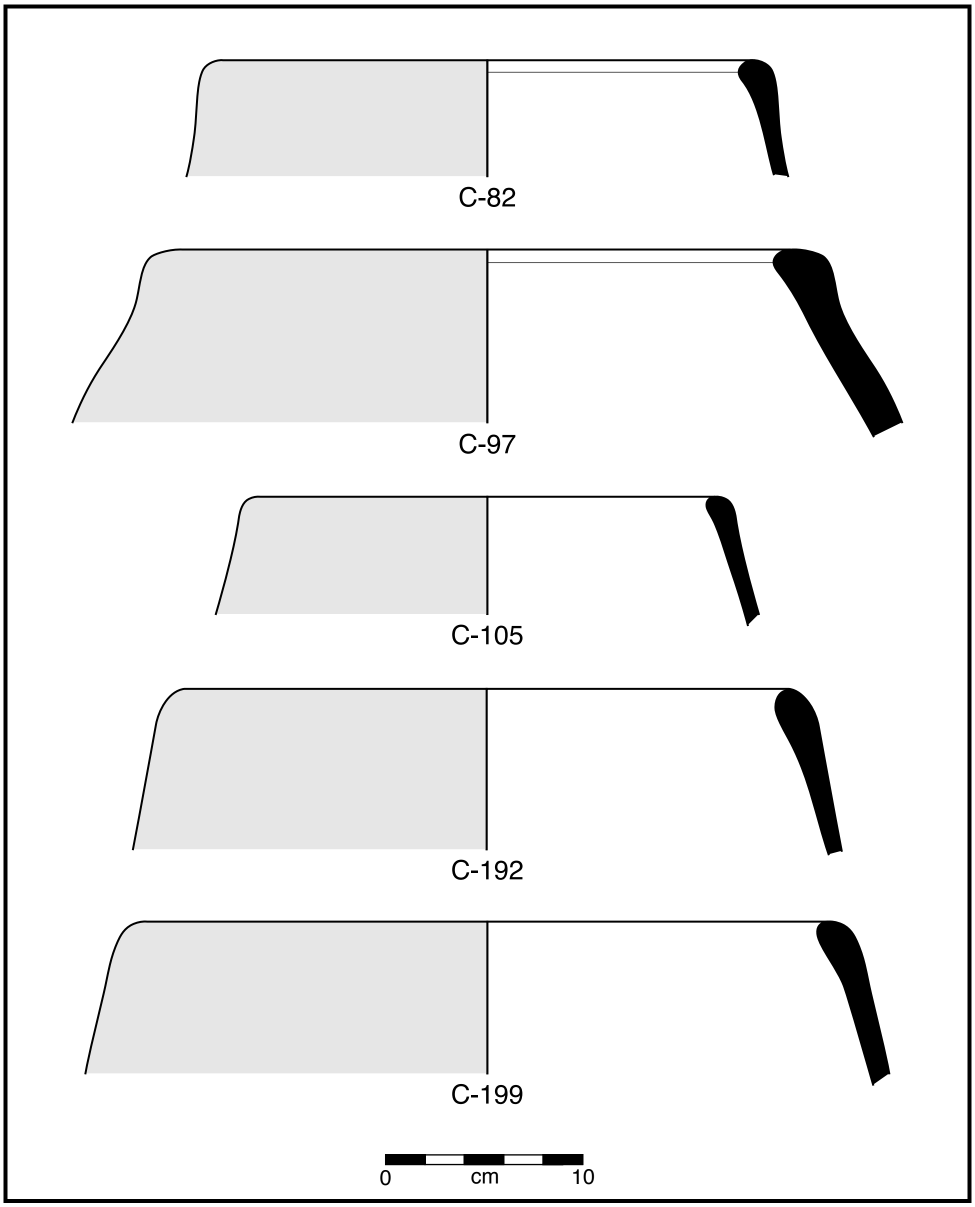

Figure 4.89: Examples of Pre-Islamic-Style Large Open Jars with Straight Walls.

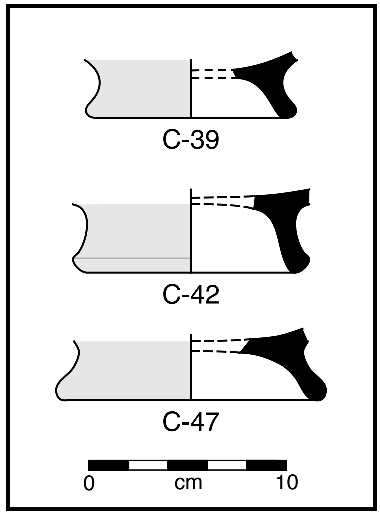

Figure 4.90: Examples of Pre-Islamic-Style Ring Bases.

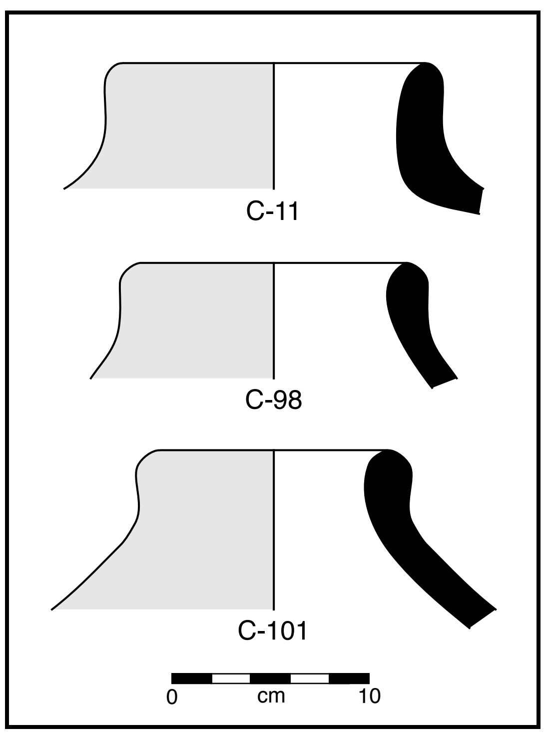

Figure 4.91: Examples of Raybūn Type 2.0b style jars.

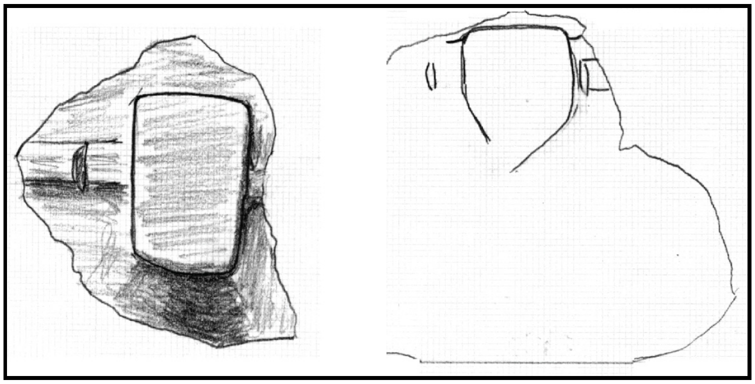

Figure 4.92: Examples of handles from Rectangular Lug Handle Bowls. C-225 (*left*), C-311 (*right*).

at Jūjah, and the frequency with which they are inscribed with gods' names (especially Wadd, as C-3) suggests that they probably had cultic purposes. (See Fig. 4.62, above.)

4.4.14 Idiosyncratic and Problematic Forms

A few forms should be mentioned for their easy recognizability which, nevertheless, cannot be definitively correlated with particular vessel types. These forms are discussed below.

Bottles

C-26, C-126, C-161, C-174, C-177, C-250, C-271, and C-272 are all fragments of bottles from the Islamic period. Carrying a wide variety of decorations and forms, they are here lumped as a particular kind of vessel. However, they clearly represent a number of distinct variations which, if the sample size were larger, would certainly constitute multiple types. (See Fig. 4.93.)

Round Bottomed Vessels

C-123 and C-136/C-137 are from two round bottomed vessels. The walls of these vessels tuck underneath, with little or no carination or change is thickness to form the vessels' bottoms. Published comparanda are mostly Pre-Islamic, but the form itself is too simple to be otherwise meaningful. C-123 is slipped in a manner that is generally Islamic in date. (See Figs. 4.35 and 4.50, above.)

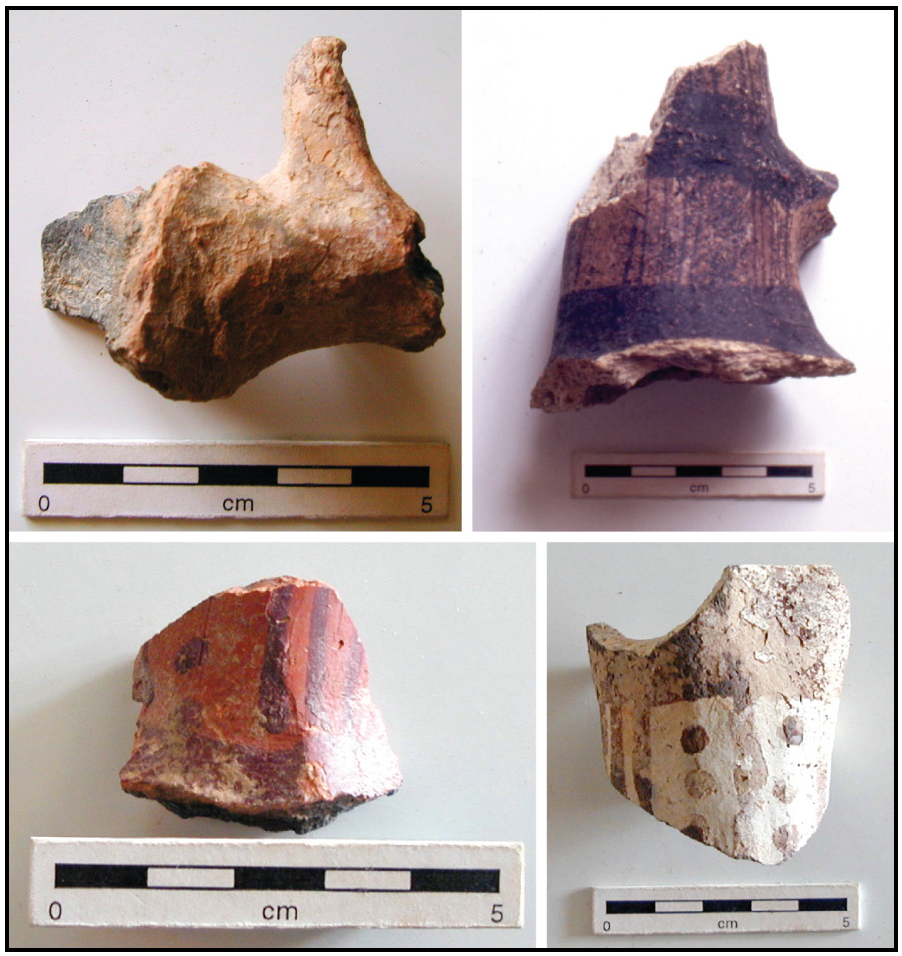

Figure 4.93: Examples of neck sherds from bottles. *Top Row, L to R:* C-26, C-126. *Bottom Row, L to R:* C-161, C-177.

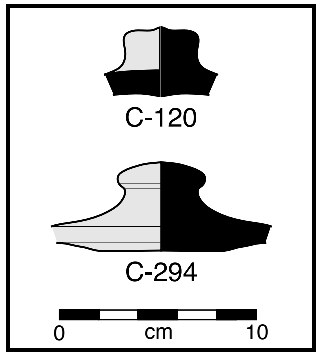

Figure 4.94: Examples of knob handled lids.

Heavy Flat Bases

C-395 and C-396 are large coarse and heavy sherds showing a flat, unelaborated base and lacking enough of any wall section for proper identification of vessel type. C-379, though similarly lacking in identifying traits, is larger and heavier still. These three sherds can be compared to Whitcomb, 1988, Fig. 6t.[41]

Knob Handled Lid

C-120, C-292, and C-294 are knob handles attached to the centers of flat lids. In no case is enough of the lid preserved to identify its full diameter (or, by extension, the size of the vessels that these lids topped). Compare to Whitcomb, 1988, Fig. 17p. (See Fig. 4.94.)

Plate or Flat Lid

C-9, C-227, C-402, and C-403 are all fragments of plates or flat lids. Owing to the simplicity of the form, we cannot be sure of their intended use or their (or their age), but nevertheless note their presence in contexts—villages and forts—where food storage and preparation are expected.[42] (See C-9 in Fig. 4.34, above.)

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[41] No drawings of these sherds were made, and the photographs are not particularly illuminating, given these sherds' coarseness and lack of identifying features beyond their size and heft.

[42] In addition to these four sherds, an additional example of a plate or lid was collected as part of bag B-18 from site S-13, but never cataloged.

Chapter 5

Small Finds

In addition to surace ceramics, surface collections of small finds were made on each site visited. Though these collections were not systematic, they are nevertheless useful for understanding the chronology and the function of the sites. Notable finds, grouped by type, are presented below.

5.1 Architectural Elements

5.1.1 Stone Plaques

O-1 Limestone wall plaque, dressed and inscribed (I-19) on one face with the Musnad characters 𐩮[. . .] (Ṣ [. . .]). Found on the scree slope at the eastern edge of S-23, below the presumed location of a hillside temple. 9.6cm wide x 4.6cm tall x 7.1cm thick (see Fig. 5.1).

O-2 Limestone wall plaque, dressed on two faces and inscribed (I-20) on its face with the Musnad characters 𐩧|𐩥𐩩 (R W T). Found on the scree slope at the eastern edge of S-23. 13.0cm wide x 10.2cm tall x 12.9cm thick (see Fig. 5.2).

O-3 Limestone wall plaque, dressed on two faces and inscribed (I-21) on its face with the Musnad characters 𐩫𐩧 (K R). Found on the scree slope at the eastern edge of S-23. 6.6cm wide x 9.7cm tall x 4.9cm thick (see Fig. 5.3).

O-4 Limestone wall plaque, dressed and incised on one face. Found on the scree slope at the eastern edge of S-23. 8.9cm wide x 6.2cm tall x 3.2cm thick.

O-5 Limestone wall plaque, dressed on two faces and inscribed (I-22) on its front with the Musnad characters 𐩧𐩲𐩵[𐩷] (R ʿ D [Ṭ]). Found on the scree slope at the eastern edge of S-23. 11.9cm wide x 6.3cm tall x 6.5cm thick (see Fig. 5.4).

O-6 Limestone wall plaque, dressed on one face. Found on the scree slope at the eastern edge of S-23. 13.9cm wide x 5.8cm tall x 7.6cm thick.

O-9 Limestone wall plaque. One face dressed and painted with a black band. Found on the surface of S-27, near the robbed out area. 7.0cm wide x 8.3cm tall x 6.1cm thick.

O-10 Limestone wall plaque. Entire width apparently preserved, but top end is broken off. Vertical ridge on face, with plaster coating, into which are impressed a pattern of small triangles. Ridge is flanked by bands of black paint. Found on the surface of S-27, near the robbed out area. 10.6cm wide x 8.8cm tall x 3.5cm thick. (See Fig. 5.5.)

O-11 Limestone wall plaque, dressed on two faces. Raised ridge on the front face, covered in plaster into which are impressed a pattern of small triangles. A band of black paint runs vertically along the front face and along the front edge of the top surface. Found on the surface of S-27, near the robbed out area. 6.3cm wide x 7.0cm tall x 4.3cm thick. (See Fig. 5.6.)

O-25 Intact limestone wall plaque from S-26. Raised central ridge. Face and ridge have lime plaster surfaces. Pattern of downward-pointing triangles impressed into lime on the ridge. Reddish-brown paint on the ridge, and black paint on the flat faces of the plaque. Found in 1999 in the newly looted interior of structure A-28. 12.3cm wide x 19.7cm tall x 6.3cm thick.

O-26 Fragment of a limestone wall plaque with lime plaster face into which a pattern of small triangles is impressed. Found in 1999 in the newly looted interior of structure A-28 at S-26. 8cm wide x 6.5cm tall x 1.9cm thick. (See Fig. 5.7.)

O-27 Fragment of a limestone wall plaque with lime plaster face into which a pattern of small triangles is impressed. Found in 1999 in the newly looted interior of structure A-28 at S-26. 10.2cm wide x 9.3cm tall x 4.3cm thick.

O-28 Fragment of a limestone wall plaque with raised central ridge. Traces of plaster on the face. Found in 1999 in the newly looted interior of structure A-28 at S-26. 12.5cm wide x 12.9cm tall x 5.9cm thick.

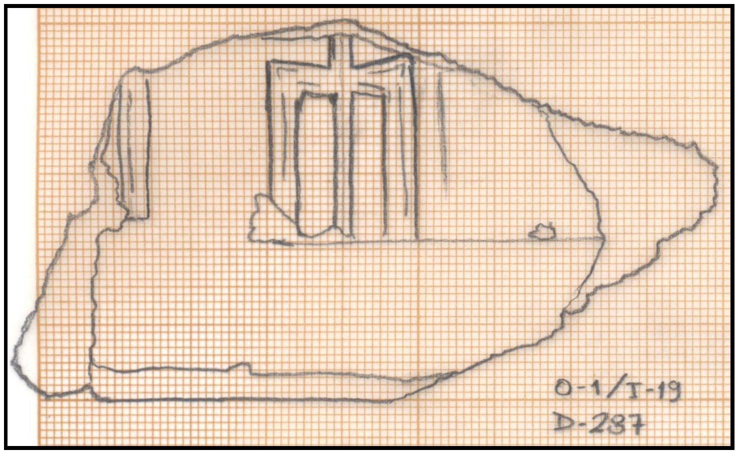

Figure 5.1: Measured drawing of plaque O-1, showing inscription I-19.

O-29 Fragment of a limestone wall plaque. Raised central ridge. Face and ridge have a lime plaster surface. Pattern of downward-pointing triangles impressed into lime on the ridge. Reddish-brown paint on the ridge, and black paint on the flat faces of the plaque. Found in 1999 in the newly looted interior of structure A-28 at S-26. 8.8cm wide x 10.2cm tall x 7.5cm thick.

O-30 Fragment of a limestone wall plaque. Raised central ridge. Face and ridge have a lime plaster surface. Pattern of downward-pointing triangles impressed into lime on the ridge. Reddish-brown paint on the ridge, and black paint on the flat faces of the plaque. Found in 1999 in the newly looted interior of structure A-28 at S-26. 8.0cm wide x 9.1cm tall x 6.7cm thick.

O-31 Fragment of a limestone wall plaque with a raised central ridge and traces of a lime plaster face and black paint. Found in 1999 in the newly looted interior of structure A-28 at S-26. 13.5cm wide x 10.9cm tall x 8.5cm thick.

O-76 Fragment of an undecorated limestone wall plaque from S-32. Face and three edges dressed. Fourth edge is broken off. 15.9cm wide x 9.0cm tall x 5.5cm thick.

Figure 5.2: Plaque O-2, showing inscription I-20.

Figure 5.3: Plaque O-3, showing inscription I-21.

Figure 5.4: Plaque O-5, showing inscription I-22.

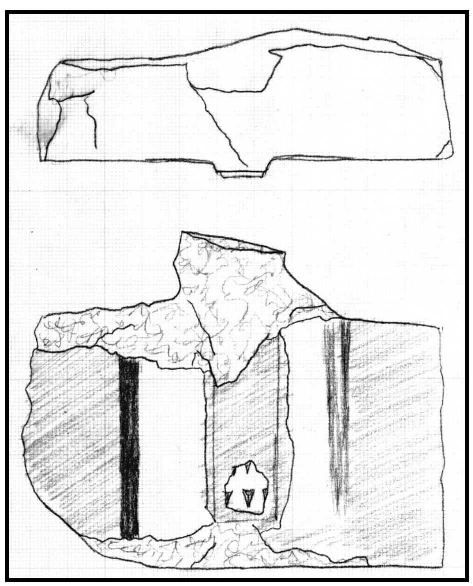

Figure 5.5: Half scale drawing of limestone and plaster plaque O-10.

Figure 5.6: Photograph of limestone and plaster plaque O-11.

Figure 5.7: Photograph of limestone and plaster plaque O-26.

Plaques O-2, O-3, O-4, O-5, and O-6, all found in close proximity at S-23, are indicative of a substantial structure at the eastern end of the site. These objects were all found on the lower portion of the scree slopes of a minor ridge, the profile of which could well have accommodated a building. Their findspot implies that these stone plaques once lined the walls of a building that stood on a level spot midway up the slope, but have since tumbled downhill following its destruction. In all likelihood, given the quality of the masonry, this structure would have been a hillside temple, such as those discovered by the French survey.[1] Similar plaques, in secondary contexts and reused as pavers, were found in the excavations of the Level I and Level II houses of Jūjah 1 (S-24).[2] Unforunately, as with the plaques from Jūjah, the inscriptions on the plaques from S-23 are too fragmentary to be reconstructed, and are only useful to the extent that they confirm that these pieces are Pre-Islamic in date.[3] O-76, simply because it is a fragmentary wall plaque of finely dressed limestone, probably belongs to the same group—though not necessarily from a temple complex—and is most likely also Pre-Islamic.

O-26 and O-27, though they are clearly from different types of plaques than O-25, O-28, O-29, O-30, O-31, O-9, O-10, or O-11, are similar in their composite construction (i.e., limestone covered with a thin lime plaster layer) and in their decoration (i.e., patterned small triangular impressions). Moreover, the quantity collected within the ruins of structure A-28 at site S-26 prove a co-occurrence of these types of plaques and the distinctive Pre-Islamic Ḥaḍramī lattice-work encased wall construction technique. These features—finely carved wall plaques and great quantities of wood—suggest that A-28, despite having a floorplan typical of Ḥaḍramī farm houses,

[1] See Breton, 1980. Unfortunately, considerable disturbance to the site, including mining of the hillside (in addition to the earth-moving mentioned above 3.1.1), has obliterated any standing architecture on the scree. The site was discovered by MHAS in 1997 and revisited in 2004, but, despite concerted efforts on both occasions, we failed to find the building's foundations (or, indeed, its exact location).

[2] Hansen, 1994, pp. 15–16.

[3] The best preserved example of this type of structure is surely the temple of Sayīn at Bā Quṭfah, with its numerous dedicatory inscriptions, many of which are written upon wall plaques similar to those from S-23 (Breton, 1979a; Pirenne, 1979). Though whereas one can date the Bā Quṭfah inscriptions palaeographically, the pieces from S-23 are so fragmentary that most of the diagnostic features of their characters (i.e., their proportions, and the size and shapes of their serifs) are missing. What can be gleaned from their palaeography, however, suggests a date of teh mid to late 1st millennium BC. Moreover, with the exceptions of plaques O-1 and O-6, the quality of these inscriptions is far poorer than those from Bā Quṭfah—suggesting that this was a smaller and less important temple.

is in fact an elite residence or administrative edifice. The discovery, however, of raised central ridge plaques, in the ruins of a temple to Sayīn, by the SoYCE survey at Liqlāt (S-2), shows that this decorative motif is not restricted to domestic structures.[4] Furthermore, one plaque fragment similar to O-26 and O-27 was found by me in 1994 at S-27, but not collected or formally recorded. Since S-27 also yielded raised central ridge type plaques, and since that type and the flat lime-covered type are also found in close proximity within structure A-28 at S-26, it is reasonable to suppose that these two types of plaques are part of a single decorative scheme employed in both locations.

5.1.2 Wooden Architectural Elements

O-34 Wooden window decoration. Part of a *ḫalfah* (i.e., the Ḥaḍramī variant of a *mašrabiyyah* screen) from S-29. Arched underside with crow step decoration along upper edge. Tenons on ends, for securing to the window frame. 30.6cm wide x 9.2cm tall x 1.4cm thick. (See Fig. 5.8.)

O-39 Shaft of a wooden key, of type still in occasional use today, from S-28. This piece has a notch along one lateral edge of its shaft, and its butt end is drilled and decoratively carved. All of the teeth are missing, and the underside of the shaft is worn smooth. 18.0cm long x 2.5cm wide x 1.7cm thick. (See Fig. 5.9.)

O-34 is a *ḫayš*, the decorative strip capping the *ʿuqf* arches of a Ḥaḍramī window screen.[5] It closely resembles the screens currently installed in the windows of Qaṣr Sayʾūn, but differs from the examples given by Damluji in that this one incorporates the apex of the arch into its lower edge, whereas her examples show these as two separate pieces. It is not known whether this is a significant difference in construction techniques—and, if so, whether the difference is attributable to minor local variations or temporal distinction, though the Qaṣr Sayʾūn comparison might argue for the former. (S-29 lies only a short distance to the east of Sayʾūn.) The key, on the other hand,

[4] Sedov, 1995b, Figs. 4.3 and 4.6.

[5] See Damluji, 1992, pp. 18–23.

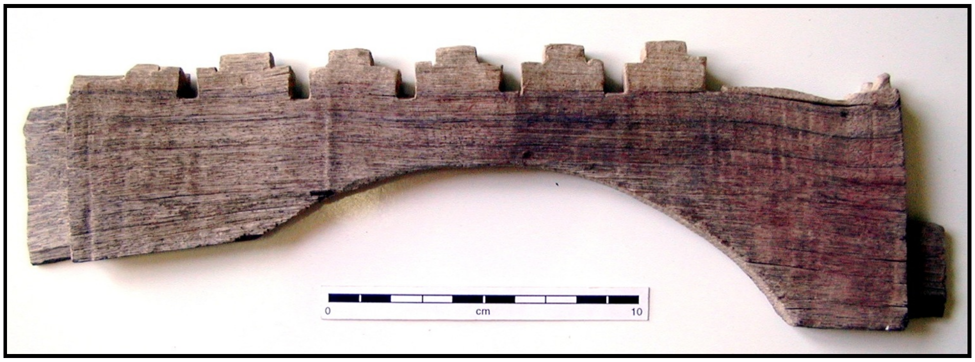

Figure 5.8: Wooden window decoration O-34.

Figure 5.9: Wooden key shaft O-39.

provides very little useful information beyond underscoring the relatively recent date of S-28's abandonment. Both pieces, being wood, could of course be subjected to chronometric dating, but have not been.[6]

5.2 Censers

O-8 One leg and one side of a shallow limestone incense burner. Found in the house at the eastern end of S-23. 8.8cm wide x 3.5cm thick x 5.3cm tall. (See Fig. 5.10.)

O-19 One leg of a four-legged clay incense burner. Reddish-brown painted lines on exterior surfaces. From S-51 and probably from the same object as O-20, though these pieces do not join. 3.0cm wide x 1.8cm thick x 4.1cm tall. (See Fig. 5.12.)

O-20 Clay incense burner, similar to those used in the Wādī Ḥaḍramūt today, from S-51. Reddish-brown painted bands, dots, and crosshatching on the exterior surface and rim. 3.3cm wide x 3.1cm thick x 6.7cm tall. (See Fig. 5.12.)

O-24 Base of a four-legged limestone incense burner from S-78. Top and three legs broken off. Light incisions and red paint visible on exterior surfaces. 8.2cm wide x 7.2cm thick x 4.4cm tall. (See Fig. 5.10.)

O-139 Base and part of the bowl of a cylindrical limestone incense burner. Found at S-4 by Abdulrahman as-Saqqaf in the year prior to the commencement of the MHAS. Object was cataloged and drawn by this project, but is in the possession of the Sayʾūn Museum. 8.0cm tall; 7.5cm diameter at base. (See Fig. 5.11.)

Incense burners (*majāmir*), in various forms and materials, are a commonly-found artifact type from South Arabia. Though incense was (and is) burned for various ritual and domestic purposes,

[6] Subjective assessments of the weathering of wooden objects—including ceiling beams and other architectural elements—can be very difficult, on account of the generally excellent preservation of wood in the arid climate of the Wādī Ḥaḍramūt. For example, wooden surveying stakes left in the ground in the 1994 season of the NYU excavations at Jūjah were recovered in 2004 showing no noticeable signs of weathering.

Figure 5.10: Cuboid limestone incense burners. O-8 (*left*), showing the interior of its bowl, and the underside of O-24 (*right*).

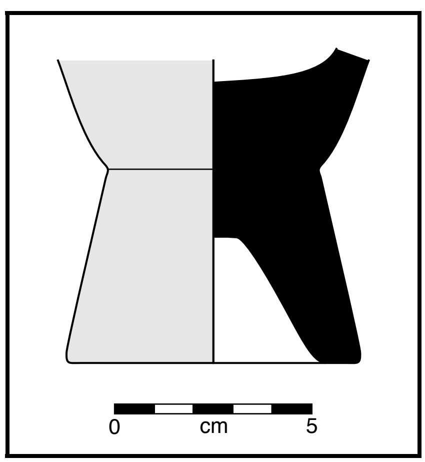

Figure 5.11: Cylindrical limestone incense burner O-139.

Figure 5.12: Clay incense burner fragments O-20 (*left*) and O-19 (*right*).

variations in the form and materials of censers does assist one in roughly dating archaeological sites. O-8 and O-24 are variations of the "cuboid" limestone incense burners well known from Pre-Islamic South Arabian sites. Cuboid incense burners may be thought of as personal items, as opposed to the larger and more elaborate pyriform censers.[7] As such, the discovery of O-8 and O-24 at settlement sites—and, in the case of O-8, within the walls of a house—is not surprising. Though the exact context of the cylindrical censer O-139 is unknown, this type is far less commonly found than are cuboid censers, perhaps indicating a specialized function. A very similar one, in fact, was found on Liqlāt (S-2), in the ruins of a temple to Sayīn, by the SoYCE survey[8]—so this particular form may be reserved for cultic purposes. O-19 and O-20, presuming that they belong to the same object, are, by their material, form, and decoration, clearly an Islamic period incense burner—and perhaps quite recent. Though I have not found the identical form in the suqs of Ṣanʿāʾ, Sayʾūn, or Šibām, a comparable modern piece from coastal Ḥaḍramūt may

[7] See Hassell, 2002, p. 186.

[8] Sedov, 1996a, p. 256.

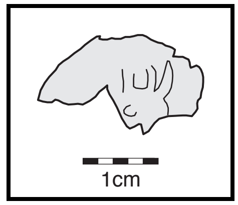

Figure 5.13: Coin O-116.

exist in the British Museum.[9] The three stone censers found, however, are all clearly Pre-Islamic in date, and the cuboid burners, based on stylistic similarities to the AFSM pieces, are probably from the 1st century BC–1st century AD.[10]

5.3 Coins

O-116 Copper coin fragment from S-35. Obverse may show a bucranium, but preservation is very poor. 1.8cm wide x 0.2cm thick. (See Fig. 5.13.)

O-117 Bronze fragment, possibly of a small coin, from S-35. 1.9cm wide x 0.2cm thick.

O-118 Bronze coin from S-35. Obverse has a box enclosing the Musnad inscription 𐩦𐩤𐩧 (I-49). Reverse has a bull in profile, facing right, with a lunar disk between its horns and the Musnad inscription ϟ⫯⍊ (I-48) over its back. 1.9cm x 1.6cm x 0.2cm thick. (See Fig. 5.14.)

Though numismatic finds are not uncommon in the Wādī Ḥaḍramūt, particularly at Pre-Islamic sites, only three coins were found by the MHAS—and all three examples were found on the site of S-35. Because of their poor preservation, very little commentary can be made about O-116 or O-117. However, if the obverse of O-116 is, in fact, a bucranium, then it can be compared to Sedov and ʻAydarus 1995, p. 35, No. 58, or Simpson 2002, p. 123, Fig. 12.3. On the other hand, O-118 is certainly of the same well-known type of Ḥaḍramī coin as Munro-Hay 1991, p. 398, Fig. 1, Sedov and ʻAydarus 1995, p. 32, No. 48 and p. 35, No. 59, and Simpson 2002, p. 78, No. 81. The

[9] Posey, 1994, p. 48, 1993As.11.16.

[10] Hassell, 2002, p. 189.

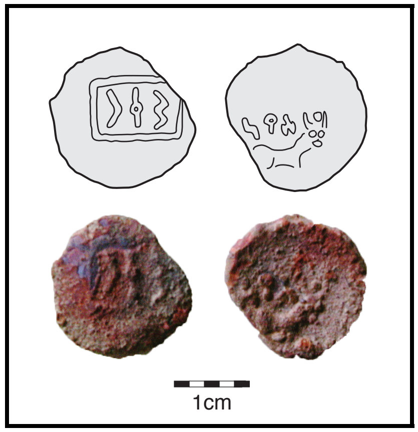

Figure 5.14: Coin O-118.

inscription on its obverse (Š Q R) is the name of the royal palace at Šabwa, where it was probably minted, and the inscription on the reverse (S Y N) is, of course, the name of the Ḥaḍramī moon god. The god's name, here, can probably be considered a caption to the bull (which is an aspect of Sayīn). In and of itself, the presence of this coin at S-35 is not overly significant, but it does suggest that the site belonged to the kingdom of Ḥaḍramūt—which one would expect, given its location—and that it dates, at least in part, to the "early" or "middle" periods at Qanaʾ (i.e., the 1st through 4th centuries, AD; see Sedov and ʿAydarus 1995, p. 34). This dating supports Sedov and as-Saqqaf's conclusion that the site dates to the first centuries AD.[11]

5.4 Jewelry

5.4.1 Beads

O-7 Carnelian bead, slightly lentoid. Found on the scree slope at the eastern edge of S-23, below the presumed location of a hillside temple. 1.6cm diameter x 1.3cm thick. (See Fig. 5.15.)

O-32 *Oliva* shell from S-30. Pierced longitudinally. Worn smooth on its exterior surfaces. 3.0cm long. (See Fig. 5.16.)

[11] Sedov and al Saqqaf, 1996, p. 60.

Figure 5.15: Carnelian bead O-7.

Figure 5.16: *Oliva* shell O-32.

O-125, O-126, O-127 Disks made from lateral sections of *Conus* shells. Found at S-46. 1.7–1.8cm diameter x 0.2cm thick. (See Fig. 5.17.)

O-128 *Oliva* shell from S-46. Pierced longitudinally. 2.0cm long.

O-141 Cowrie shell (probably *Cypraea turdus*) from S-5. Back ground down. 3.0cm long. (See Fig. 5.18.)

O-167 Cowrie shell (probably *Cypraea turdus*) from S-84. Back ground down. 2.9cm long. (See Fig. 5.18.)

None of the shells found in the MHAS are particularly helpful as markers for trade or chronology, in that they can be found in the Arabian Sea and, despite the fact that they all come from known

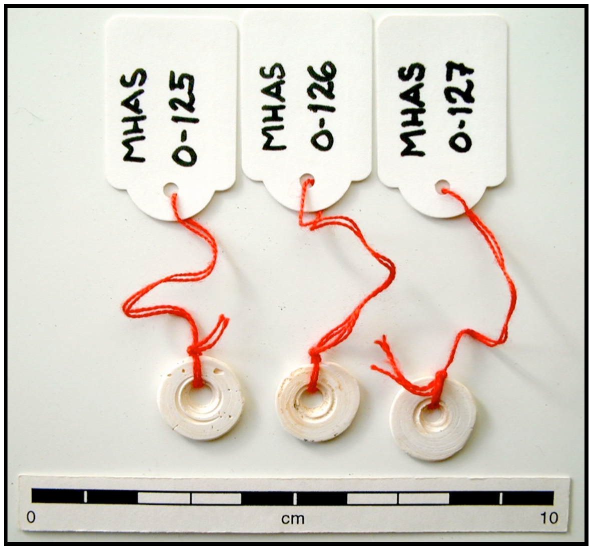

Figure 5.17: Disk beads made from sections of *Conus* shells.O-127

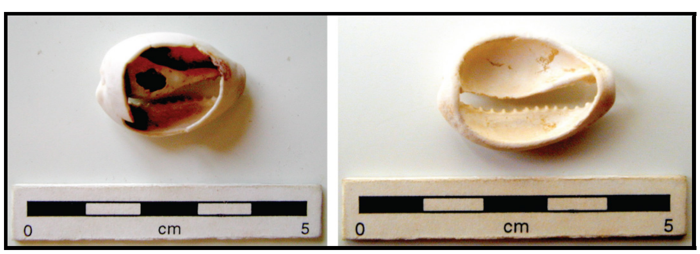

Figure 5.18: Beads made from cowrie shells. O-141 (*left*) and O-167 (*right*).

or likely Islamic period sites, have exact correlates in the Pre-Islamic tombs at Ḥurayḍah.[12] These shells must have been traded inland from the coast, and processed in a similar manner, for centuries. The carnelian bead (O-7) is slightly more helpful in that parallels also exist at Ḥurayḍah for it.[13] Insofar as S-23 is also a known Pre-Islamic site, the Ḥurayḍah comparanda may be an additional argument supporting the dating of this site contemporary to Caton-Thompson's tombs. However, since the bead is a simple form and of a locally-available material, its importance for dating S-23 pales when compared to the inscriptions also found there (see 5.1.1).

5.4.2 Glass Bracelets

O-33 Fragment of a glass bracelet from S-30. Black glass with red and yellow bands and yellow prunts on its outermost edge. Irregular circular cross-section. (See Fig. 5.19.)

O-40 Fragment of a glass bracelet from S-28. Black glass with yellow, red, and white bands. Yellow, red, and white dots and beads on outer edge. Oval cross-section with innermost edge thickened laterally, forming two lobes. (See Fig. 5.19.)

O-148 Fragment of a glass bracelet from S-14. Dark green glass with black and yellow bands. Teardrop cross-section. (See Fig. 5.19.)

O-149 Fragment of a glass bracelet from S-14. Black glass with yellow band. White, yellow, blue, and red glass dots and irregular prunts on outermost edge. Triangular cross-section. (See Fig. 5.19.)

O-150 Fragment of a glass bracelet from S-14. Black glass with red, white and yellow bands. Yellow glass prunts on outermost edge. Oval cross-section, interior edge thickened laterally forming two lobes (trefoil). (See Fig. 5.19.)

O-151 Fragment of a glass bracelet from S-13. Unelaborated black glass. Triangular cross-section. (See Fig. 5.19.)

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[12] Caton-Thompson, 1944, pp. 104–105 and Pl. XLI.

[13] Caton-Thompson, 1944, Pls. XL and XLII, Nos. 1–3 and 7.

O-152 Fragment of a glass bracelet from S-13. Black glass with red and bright green banding. Green banding covers nearly the entire exterior surface. Outermost edge has yellow glass prunts. Oval cross-section with laterally thickened interior edge, forming two lobes (trefoil). (See Fig. 5.19.)

O-153 Fragment of a glass bracelet from S-13. Dark green glass with yellow glass prunts on outermost edge. Oval cross-section, with flattened interior edge. (See Fig. 5.19.)

O-154 Fragment of a glass bracelet from S-13. Black glass with red and yellow bands. Yellow glass prunts on outermost edge. Triangular cross-section. (See Fig. 5.19.)

O-155 Fragment of a glass bracelet from S-13. Translucent dark green glass with opaque light blue band covering one half of the exterior surface. Oval cross-section with flattened interior edge. (See Fig. 5.19.)

O-156 Fragment of a glass bracelet from S-13. Black glass with red and yellow bands. Yellow dots on exterior edge. Parabolic cross-section. (See Fig. 5.19.)

Glass bracelets are another frequently found artifact at Islamic period sites in the Ḥaḍramūt. Most of these are presumed to come have been made in towns on the ʿAdan littoral (especially at Kawd am-Saylah[14]) until the 16th century when production there came to an end and moved further afield to India.[15] All of the bracelet fragments collected by the MHAS are locally-produced types—so, to the extent that ʿAdanī production did, in fact, cease at that time, it implies a pre-16th century presence at sites S-13, S-14, S-28, and S-30. Comparison with Whitcomb's published examples further refines the seriation of Islamic period MHAS sites. Bracelets from S-13 closely match those from sites identified by Whitcomb as Early and Middle Islamic.[16] Bracelets from S-14,

[14] See Monod, 1978.

[15] Whitcomb, 1988, p. 202.

[16] Whitcomb, 1988, Fig. 21. O-154 and O-156 are similar to Whitcomb's Figs. 21.m, 21.k, and 21.m from the site of Kawd am-Saylah, which he assigns to the Middle Islamic period. More recently, this site was reexamined by King and Tonghini. Following construction activity, materials newly brought to the surface have allowed them to re-date the site into the Early Islamic period (King and Tonghini, 1996, p. 40).

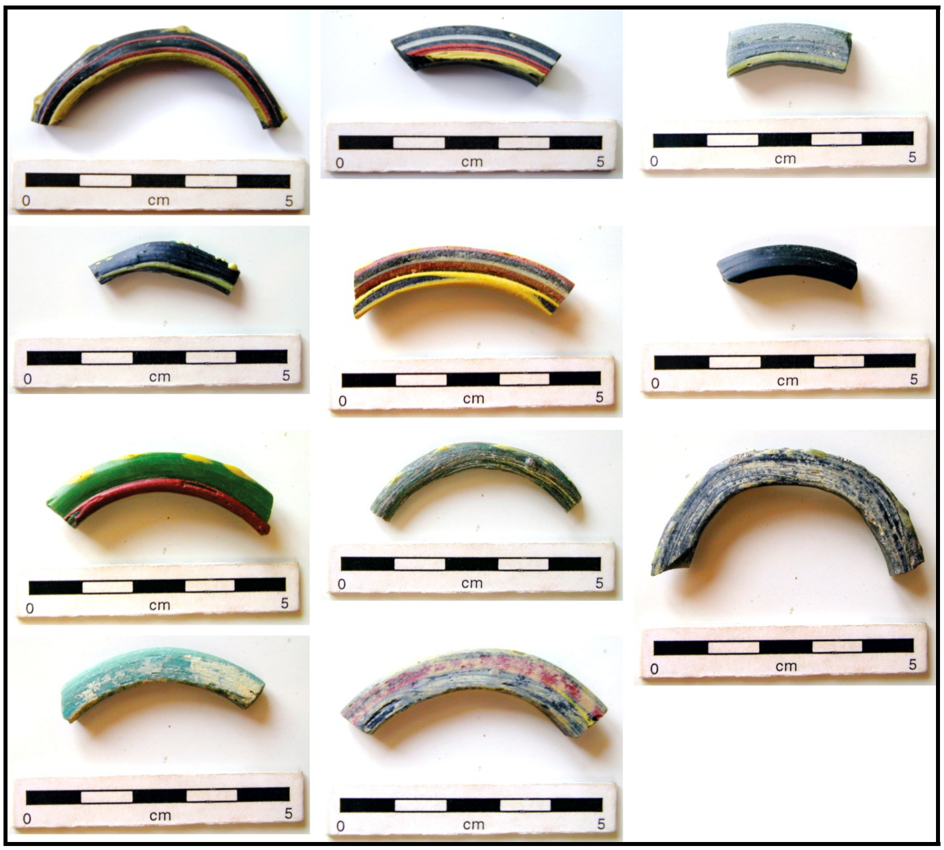

Figure 5.19: Fragments of glass bracelets. *Top Row, L to R:* O-33, O-40, and O-148. *Second Row, L to R:* O-149, O-150, and O-151. *Third Row, L to R:* O-152, O-153, and O-154. *Bottom Row, L to R:* O-155 and O-156.

though without good correlates among Whitcomb's examples, appear most similar to fragments from Middle and Late Islamic period sites.[17] Likewise, O-33 is most similar to examples from Late Islamic sites. And though I found no direct comparanda for O-40, the distinctive light blue coloration of some of its prunts should permit positive identification by a specialist.

5.5 Lithics

Lithics were collected on many sites. Mostly crude forms and debitage, however, these add little to our understanding of the sites from which they were collected. Nevertheless, the examples listed below are sufficiently interesting that they warrant additional commentary.[18]

5.5.1 Large Bifacial Tools from Wādī Bin ʿAlī

O-77 Bifacial blade or scraper from S-65. 9.8cm long x 5.1cm wide x 3.1cm thick. (See Fig. 5.20.)

O-78 Bifacial point or hand axe from S-65. 10.0cm long x 5.7cm wide x 2.1cm thick. (See Fig. 5.20.)

O-79 Bifacial point or hand axe from S-65. 14.0cm long x 5.7cm wide x 2.8cm thick. (See Fig. 5.20.)

O-80 Bifacial point or hand axe from S-65. 13.0cm long x 5.6cm wide x 2.7cm thick. (See Fig. 5.20.)

O-81 Bifacial point or hand axe from S-65. 8.6cm long x 4.0cm wide x 2.3cm thick. (See Fig. 5.20.)

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[17] One would like to compare the MHAS bracelets with fragments excavated at aš-Šiḥr, which probably date to the 14th century (Hardy-Guilbert, 2001, p. 71). Unfortunately, however, those pieces are only published as line drawings without descriptions—and, lacking information about their coloration, positive identification is impossible. Nevertheless, O-151 does resemble SH 97 2023-6 (Hardy-Guilbert, 2001, Fig. 3).

[18] The full corpus of lithics collected in the course of the MHAS project can be viewed online at `http://www.lugal.com/mhas/`.

O-82 Bifacial point or hand axe from S-65. 15.1cm long x 4.6cm wide x 2.3cm thick. (See Fig. 5.20.)

O-85 Bifacial point or hand axe from S-68. 13.4cm long x 4.2cm wide x 2.7cm thick. (See Fig. 5.20.)

The large bifacial tools from S-65 and S-68 in the Wādī Bin ʿAlī are somewhat enigmatic. Because of the similarity of their material, manufacture, and patination, as well as the proximity of S-65 and S-68 (these sites are in plain view of each other, on similar terrain, 700 meters apart), we can assume that the pieces belong to a similar time period and culture. Identification of that time period and culture, however, has been difficult. Initially, based on the similarity of O-78 to the hand axe published by Van Beek,[19] I assumed that these pieces were Palaeolithic, and published their discovery as such.[20] More recently, Rémy Crassard re-examined the site, and though he could not positively identify the artifacts, felt that they were unlikely to be Palaeolithic—and by comparison to the assemblage of HDOR 538, may even belong to the Holocene.[21] Regardless of their assignation, a few additional comments are warranted: most of the points on S-65, whether collected or left *in situ*, were found clustered in and around the stone rings (which I presume to be the foundations of some kind of hut); each of these objects presents a heavily patinated side and a relatively un-patinated side, which may assist in determining their approximate age; and these objects are worked on all sides, with no obvious location for hafting or grasping, so their actual function is not known. Also, a partial projectile point, O-114 (see Fig. 5.21) was found in one of the stone rings on S-68. This point clearly belongs to the Arabian Bifacial Tradition (ABT) of the Neolithic. Though this single broken projectile point is not particularly strong evidence, its presence there might argue for a Neolithic date for the stone rings—and, by extension, for the large bifaces.

[19] Van Beek, Cole, and Jamme, 1963, Pl. 4.1.

[20] Zimmerman, 2000, p. 28.

[21] Crassard, 2007, pp. 306–307.

Figure 5.20: Large bifaces from sites S-65 and S-68. *Top Row, L to R:* O-77, O-78. *Second Row, L to R:* O-79, O-80. *Third Row, L to R:* O-81, O-82. *Bottom Row:* O-85.

Figure 5.21: Projectile point O-114 from site S-68.

5.5.2 Obsidian Microliths from S-46

O-120 Eighteen pieces of obsidian, cataloged as a group. Microliths, including trapezoidal pieces, and some probable debitage. Longest piece 3.2cm. Largest piece 2.3 x 1.3 x 0.6cm. (See Fig. 5.22.)

The obsidian microliths from S-46 are not so remarkable in and of themselves, but are notable for their density at this particular site. Since the site is of the Pre-Islamic (and possibly Islamic) period(s), it shows the persistence of a robust—though perhaps highly specialized—lithic industry well into the Iron Age, as well as the importation of the raw material for that industry. But S-46 is not unique in this regard, as early archaeological expeditions to the Wādī Ḥaḍramūt also noted the high concentration of obsidian microliths at the major Pre-Islamic sites in the area.[22]

5.6 Sculpture

O-12 Baked clay model of a human head. Crudely made, with appliqué details. Right ear is missing, but there is no evidence of it having broken off (perhaps an oversight of the artist,

[22] Huzayyin, 1937, p. 514; Caton-Thompson and Gardner, 1939, pp. 31–32. Caton-Thompson and Gardner also commented on the great quantity of obsidian microliths at Sūnah—the closest major site to S-46, to which I suspect it is related.

Figure 5.22: Obsidian microliths from S-46, cataloged collectively as O-120. (Note that the trapezoidal pieces, a common type, are inadvertently not arranged in the same orientation in this photograph.)

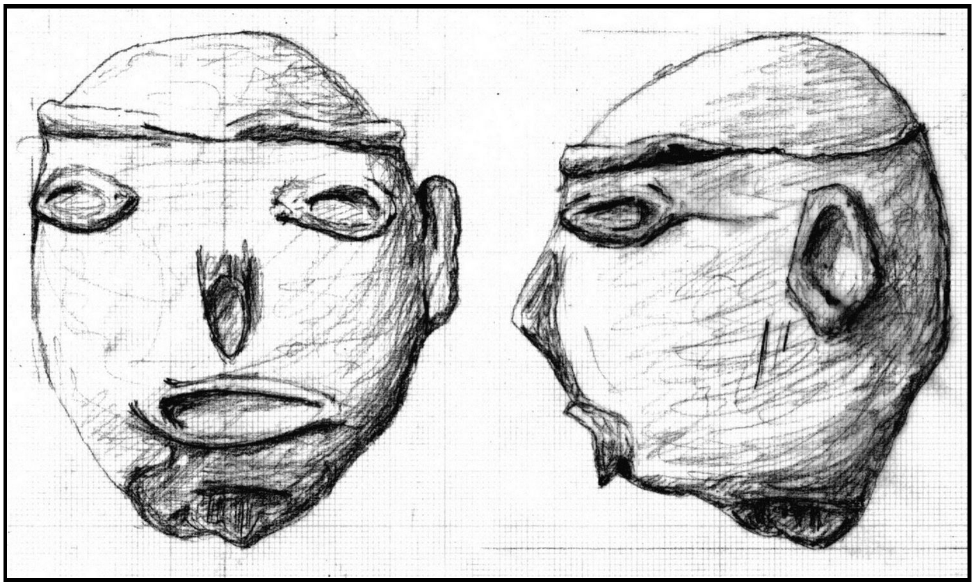

Figure 5.23: Clay head O-12.

or perhaps an indication that this piece is representative of a particular individual). Fillet around forehead. Hole at the base, with wood impressions inside, showing that it had been mounted on a stick while the clay was still wet. 9.4cm tall x 7.7cm wide. (See Fig. 5.23.)

This object was purchased by Dr. Bin ʿAqīl for 150 YR from a Šibāmī boy, and was subsequently donated to the Sayʾūn Museum. According to the seller, it was found on the surface of S-13—and there is little reason to doubt this provenance. In light of the Islamic prohibition against the representation of human forms, one may expect that it dates to the Pre-Islamic or Early Islamic periods. In the absence of other means of dating this head, however, the evidence supporting this object's presumed age is understandably tenuous.

5.7 Vessels

5.7.1 Glass Vessels

O-73 Base fragment of a clear glass drinking cup with molded fluting, apparently of modern manufacture, from S-64. (See Fig. 5.24.)

Figure 5.24: Base of glass cup O-73.

O-142 Rim fragment of bottle or juglet from S-24. Clear or light amber glass with whitish iridescence. Threading on exterior. 3.2cm diameter at rim. (See Fig. 5.25.)

The coiled glass thread under the rim of O-142 is a distinctive decorative trim, but not an especially good chronological marker, lasting from the 4th through the 6th centuries AD.[23] The earlier end of this range, however, overlaps the later end of the range given for radiocarbon dates of Level 1 at S-24,[24] suggesting that the final occupation of the site was in the 4th or 5th centuries AD.

5.7.2 Stone Vessels

O-15 Fragment of a "Beehive" jar from S-24. Entire profile preserved, rim through base. Exterior surface has incised horizontal bands and vertical stripes along its upper edge, extending 3.4cm below the rim. Made of marble or coarse, crystalline, alabaster. 5.4cm wide x 12.3cm tall x 2.2cm deep. (See Fig. 5.26.)

O-16 Rim fragments of a small alabaster "Beehive" jar from S-24. Vertical lug handle. Two joining pieces when found, but the material is in very bad condition, and the piece has deteriorated even further in storage. 3.3cm wide x 4.1cm tall x 2.9cm deep. (See Fig. 5.27.)

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[23] Fleming, 1999, p. 126.

[24] Hansen, Ochsenschlager, and al Radi, 2004, p. 65.

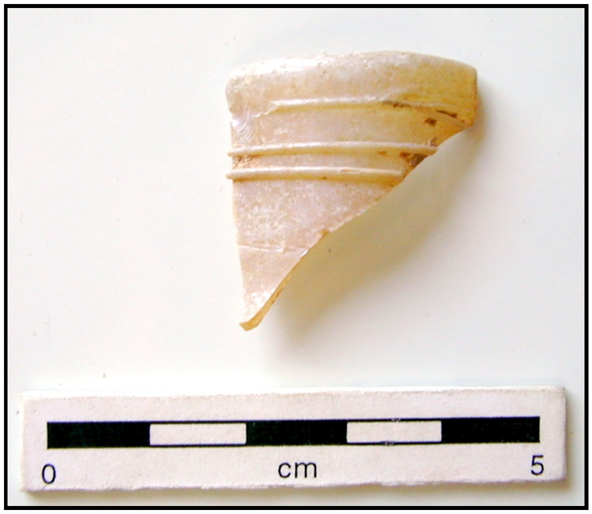

Figure 5.25: Rim of glass vessel O-142

O-115 Base fragments of a "Beehive" jar from S-35. Marble or coarse alabaster. 6.0cm wide x 9.4cm tall x 4.3cm deep. (See Fig. 5.28.)

Alabaster beehive vessels are a specific type of vessel found across Arabia, but found in greatest numbers on Pre-Islamic Southwest Arabian sites.[25] O-15 is very similar in appearance to, but somewhat taller than, HI 41 from Hajar Bin Ḥumayd (which was recovered from stratum A of that site, and dates to between the 2nd and 5th centuries AD).[26] No direct parallels were found for either O-16 or O-115, but they clearly belong to the same family, and can be broadly dated to the Pre-Islamic period.[27]

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[25] Hassell, 1997, p. 273.

[26] Van Beek, 1969, p. 276.

[27] See Hassell (1997) for a discussion of the various types of Beehive vessels from archaeological contexts. Despite the variations in their size and decoration, these objects clearly belong to a single tradition permitting only a narrow range of forms and materials—into which O-15, O-16, and O-115 comfortably fit.

Figure 5.26: “Beehive” jar fragment O-15.

Figure 5.27: “Beehive” jar fragment O-16.

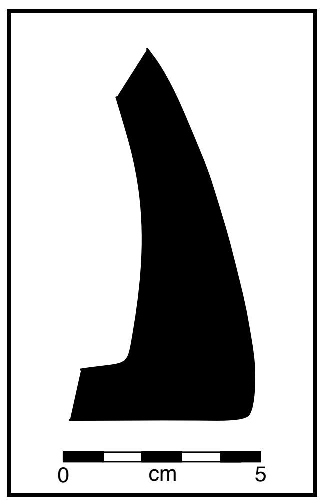

Figure 5.28: Profile of “Beehive” jar fragment O-115.

Chapter 6

Conclusions

Settlement patterns and the visibility (or invisibility) of sites inform not only our understanding of the region's history, but also our approaches to archaeological data collection and interpretation. The exploration of this dialectic undergirds the subject and methods of the present work. And though the data presented in the preceding chapters are somewhat incomplete and are therefore not amenable to statistical analyses, they are nevertheless sufficient to deepen our understanding of the archaeology of the Wādī Ḥaḍramūt and to propose some models for the settlement and land use patterns therein. We can look at the kinds and locations of sites recovered by the MHAS survey, discuss the reasons for their differential preservation, and explain the regional history in accordance with those observations.

6.1 Finding Settlement Sites

6.1.1 "Urbanism"

Like most major themes in archaeological theory, "urbanism" is impossible to define in a concise and inclusive manner.[1] Applicable definitions vary from region to region, but usually hinge on population density, population size, and societal complexity. In the sense that it is usually applied to the Ancient Near East, these three variables are intertwined in the formation of cities. Even the recent and widely publicized discovery of differing city formation processes between Northern and Southern Mesopotamia[2] presupposes the interrelationship of scale, density, and societal complexity (though arguing that the latter, in the North, did not itself drive the formation of cities, as is thought for the South). But whereas the importance of urbanism to Mesopotamian archaeology is as prominent as the tells that forms the basis of its understanding, it is much less obvious in the ancient Wādī Ḥaḍramūt. This is, of course, not to say that the concept of urbanism is inapplicable to

[1] See Cowgill, 2004, pp. 526–528, for a discussion of this problem.

[2] Ur, Karsgaard, and Oates, 2007.

the archaeology of the Wādī Ḥaḍramūt—particularly since a settled populace (sometimes referred to as an "urban" populace in popular literature) is one of its defining geographical features—but rather that a regionally appropriate notion must be employed.

Though most of the modern population of the Wādī Ḥaḍramūt is concentrated in the cities of Sayʾūn and Tarīm, its most famous city is Šibām, the "Manhattan of the Desert." As a walled city and a tell site, Šibām shares a physical similarity with archaeological sites such as Marīb and Šabwa, and by most definitions would qualify as an "urban" center (though with a population of about 7,000, just barely so). Within the modern Wādī Ḥaḍramūt, however, it is an anomaly, resembling no other city in the valley. It could be argued that the other population centers of the Wādī Ḥaḍramūt, regardless of size, are sub-urban—and, even, "suburban" (in the modern, American, sense)—more than they are "urban" in the nucleated sense with which the term is usually applied in Near Eastern archaeology.

The uniqueness of Šibām among modern cities of the Wādī Ḥaḍramūt has long been noted, and Van Beek cogently described the typical pattern of Ḥaḍramī settlement thusly: "Except in the larger towns and cities, little or no repair work is done to houses that begin to disintegrate; instead, houses are abandoned, and the inhabitants build an entirely new town nearby. Because of this practice, high mounds are not being formed now."[3] Damluji, looking at the same phenomenon from the other side, also described the extreme example of *not* moving houses in Šibām: "A common practice in Šibām has been to pull down a whole building which has been damaged beyond repair, and to rebuild it in the same position and on the same principle of design. The positions of the windows and ventilation openings are noted beforehand so they can be distributed in an identical pattern on the new building."[4]

With respect to urbanism in the Wādī Ḥaḍramūt, then, we must distinguish between mere proximity and nucleation. Modern Sayʾūn and Tarīm are relatively large cities with tens of thousands of inhabitants. Though residences are clustered around the oldest portions of the cities, densities are evenly dispersed across the cities, and trail off into the surrounding agricultural zones at the

[3] Van Beek, Cole, and Jamme, 1963, p. 541.

[4] Damluji, 1992, p. 96.

cities' margins. These cities tend to grow outwards, encroaching upon and eventually incorporating former agricultural lands. Šibām, by contrast, is extremely dense, but surrounded by an uninhabited perimeter of active fields (to its west, north, and east) and wadi channel (to its south). Population growth there does not expand outward over its walls or into its surrounding fields; instead, the town's population, if it can no longer build upwards, moves entirely out of Šibām and into the neighboring town of Saḥīl Šibām—which, itself, sprawls ever outward as its population grows.

Thus, instead of referring to "urban" and "rural"—culturally loaded terms implying social integration and the exploitation of economic resources that are inapplicable to the Wādī Ḥaḍramūt prior to the late 20th century—or "nucleation" versus mere "proximity" of residence—terms which fail to uniquely describe the qualitative differences between the two settlement modes in the Wādī Ḥaḍramūt, I propose instead the use of the terms "concentrated" and "dissipated" Ḥaḍramī settlements. These have the advantage of not only describing a state, but also a process of site formation that is applicable to modern and ancient settlements alike—"concentrated" refers to the rebuilding upon the same location, and "dissipated" refers to the "build, move, decay" pattern described by Van Beek.[5]

Under the rubric of "concentrated" versus "dissipated" settlements, of course, there are a variety of actual expressions of these modalities, which satellite imagery nicely documents for us among modern towns of the Wādī Ḥaḍramūt (see Figs. 6.1–6.5). Furthermore, I propose that the typical dissipated "build, move, decay" pattern, rather than the concentrated "build and re-build" pattern has been the normative behavior throughout the history of settlement in the Wādī Ḥaḍramūt and its tributaries. As stated above, this dissipated settlement pattern stands in contrast to the usual notions of Near Eastern urbanism, and complicates the creation of an adequate definition of Ḥaḍramī urbanism, ancient or modern, because the majority of sites with sufficient population, population density, or inferred societal complexity nevertheless fail to leave material residue that

[5] Lewis, noting a pattern of entire settlement clusters in the Himyarite highlands to shift through time, proposes the rotation of sites in response to soil depletion (Lewis, 2005, p. 213). This kind of movement of whole communities, while it may also occur in the Wādī Ḥaḍramūt, is *not* what I mean here by "dissipated settlement," which operates instead on the level of individual structures within a community .

reflects those traits in a way that Near Eastern archaeologists are trained to recognize. Moreover, the expectation—built by comparison to unambiguously urban Pre-Islamic sites such as Marīb, Timnaʿ, Hajar Bin Ḥumayd, Šabwa, and Raybūn—that Pre-Islamic archaeological sites in the Wādī Ḥaḍramūt would by necessity also be concentrated settlements (tells, in fact), has had the unfortunate effect of causing us to overlook or undervalue dissipated Pre-Islamic sites that actually do exist. This is, however, not to suggest that Tarīm- or Sayʾūn-sized dispersed urban centers once existed, but are lost to the archaeological record. Instead, it is to highlight the occurrences of the non-normative concentrated settlements such as those in the Wādī Dūʿan, at Jūjah, at Šibām, at Mašġah, and at Makaynūn (to take examples within and bordering the MHAS study area). In other words, to best understand the archaeology of the region, we must find reasons to explain the breaking of the usual behavior; we need to find social, economic, or environmental forces that lead to the formation of concentrated settlements instead of dissipated ones. Moreover, from an epistemological standpoint, we need to understand that these concentrated sites are by their very nature more prominent than dissipated sites (though not necessarily more "important")—and adjust our methods accordingly.

6.1.2 Topographic Orientation

One factor influencing this tendency toward dispersed settlement is the proclivity for settling along the perimeters of the wadi, on spurs, gravel beds, and the lowest edges of the scree escarpment. There are many reasons which may account for this: a desire to be close to the major roads (which, themselves, tend to follow the wadi bed close to the scarp); an attempt to limit the encroachment upon agricultural lands; or the need to elevate settlements up and away from the course of flash floods (to cite three obvious practical explanations for situating settlements along the edges of the wadis). With the exception of the aforementioned suburbs of Sayʾūn and Tarīm, urban expansion does not generally spread outward into the fields, but moves laterally along the bottoms of the scree slopes (see Fig. 6.6 for an especially illustrative example of this topographic orientation).

Topographic orientation, however, should best be considered on level of individual buildings—which, in aggregate, imprint this same structure upon their communities. Nor is the

Figure 6.1: Satellite image of Šibām. The most extreme example of a concentrated settlement in the Wādī Ḥaḍramūt, note how residential settlement ends abruptly at the city walls. (The buildings between Šibām's southern wall and the road are all modern commercial and industrial structures.)

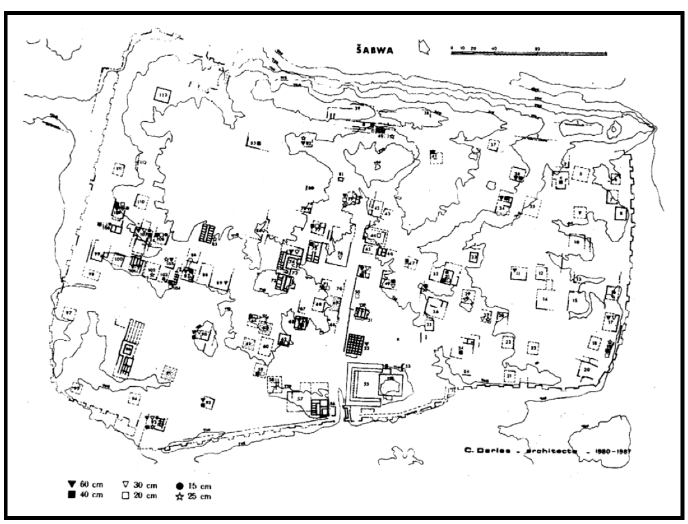

Figure 6.2: Topographic plan of Šabwa, showing its concentration (from Breton, 2003, Fig. 6). Note its similarity to modern Šibām (see 6.1, above), including its perimeter wall.

Figure 6.3: Satellite image of Ḥawṭah, one of the many towns strung along the road between Šibām and Sayʾūn. This shows the typical settlement pattern in the more densely-packed areas of the Wādī Ḥaḍramūt. Though activity there is focused around its commercial center (along the road at the western edge of this image), the settlement is fairly evenly distributed, and is expanding outward according to the local topography. It qualifies, therefore, as a "dissipated" settlement.

Figure 6.4: Satellite image of one of Sayʾūn's wealthier neighborhoods (note the swimming pools in some of the yards). Dissipated settlement here has houses widely separated and interspersed with gardens. These neighborhoods are encroaching upon orchard land to the north and northeast of the city.

Figure 6.5: Satellite image of ʿAydīd, a western neighborhood of Tarīm. Development of this neighborhood is quite new (see Damluji, 1992, p. 247), and its orthogonal grid is suggestive of Western influence or planning. This expansion west of the traditional boundaries of Tarīm, however, is yet another expression of dissipated settlement.

Figure 6.6: Satellite image of Qaṭn. Note how closely settlement here follows the topography, trailing down to a single row, one structure deep, sandwiched between the street and the steep escarpment at its western end.

topographic orientation limited to modern settlements, since it is readily seen in ancient sites as well. Breton, for example, in his description of hillside temples discovered by the French expedition, noted that these temples were aligned to the prevailing topography of their settings, rather than the cardinal points;[6] they were all situated in prominent locations for maximum visibility, but their actual alignment was dictated by the slopes upon which they were built.[7] At the risk of stretching credulity, this topographic orientation can even be seen in sites of the Ḥaḍramūt Megalithic Complex (HMC).[8] Regardless of the specific cultural connections (or lack thereof) between ancient and modern Ḥaḍramīs, and regardless of the specific set of circumstances for their prioritizing topography, the general principal of topographic orientation is a useful analytic device for understanding the archaeology of the Wādī Ḥaḍramūt.

Harding amplified this notion by contrasting the settlement patterns of the Pre-Islamic Wādī Ḥaḍramūt with those of the present day, noting that "the only visible ancient sites are those in the middle of the valleys, whereas nearly all the modern villages cling to the steep scarps".[9] This observation, however, overstates the case (and Harding, himself, conjectured that the earliest settlements in the valley would be located beneath modern settlements at the valleys' edges). Despite the fact that the major modern population centers of the Wādī Ḥaḍramūt are, in fact, located along its scarp, there are dozens of villages scattered among the fields on the alluvium and upon gravel beds on the wadi bottom (see, for example, Fig. 6.7). Conversely, (and contrary to Harding's observation), Pre-Islamic settlements are also found at the edges of the wadis; the MHAS has located Pre-Islamic settlements clinging to the escarpments (see Fig. 6.8), and the SoYCE expedition found wadi-edge late Pre-Islamic sites in the western Wādī Ḥaḍramūt.[10]

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[6] Breton, 1980, p. 5.

[7] Serjeant, in the same article, goes on to note the similarity of these Pre-Islamic structures with their Islamic counterpart at Qabr Hūd (Breton, 1980, p. 11). And though he did not mention it, the similarity extends also to the tomb of Aḥmad bin ʿĪsā al-Muḥājir.

[8] Bowen and Albright, 1958, p. 135; Vogt and Sedov, 1994?, p. 10. The comparison may stretch credulity because, whereas cultural continuity in the Wādī Ḥaḍramūt between the Pre-Islamic and Islamic periods is roundly accepted, it cannot be demonstrated between the settled Pre-Islamic population in the wadis and the builders of the HMC monuments.

[9] Harding, 1964, p. 15.

[10] Sedov, 1995a, p. 112.

Figure 6.7: Villages and hamlets in the Wādī Ḥaḍramūt, to the east of the mouth of Wādī Sarr. Clusters of up to two dozen houses, sometimes arrayed around a central plaza, dot the bottoms of the wadis. In an archaeological context, the remains of such a site would appear as a single period settlement. S-13 and S-83 are probably two such sites from the MHAS survey.

The distinction, then, between Pre-Islamic and modern settlement patterns in the Wādī Ḥaḍramūt is not binary (as Harding asserted), but rather one of propensity. Pre-Islamic settlements, in apparent disregard for the topographic orientation, were more likely to be founded on the wadi bottom than are later settlements. But the dichotomies underlying these generalities (large site versus small; wadi bottom versus edge; durable versus ephemeral; significant versus mundane; Pre-Islamic versus Islamic) fail to fully describe the social dynamic. Whatever their usefulness identifying archaeological sites, they are undermined by a deep seated conservatism in the predispositions of the region's ancient inhabitants such that small, dissipated, agricultural settlements, usually at the wadi's edge and growing house by house according to the immediate topography, are the norm regardless of era. We must strive, then, to understand the social forces that drove the Pre-Islamic Ḥaḍramīs to break those norms with such regularity.

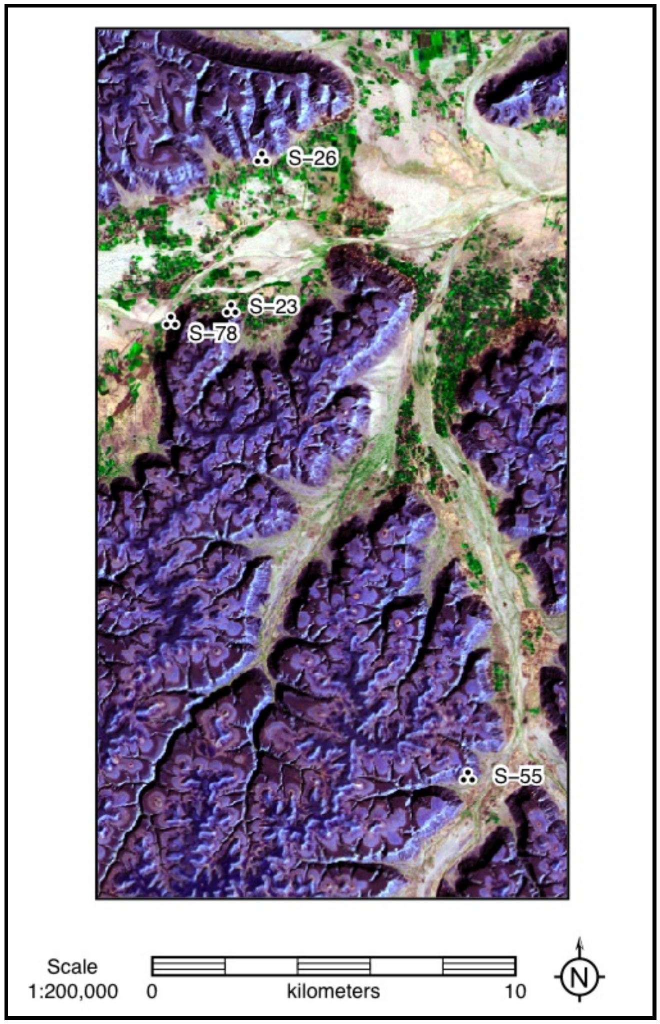

Figure 6.8: Pre-Islamic hamlets located at the edges of Wādī Ḥaḍramūt and Wādī Bin ʿAlī. Though these sites are small, their existence shows that Pre-Islamic settlement was not confined strictly to the alluvium. Note, too, that these sites appear to be single-period only. (Though S-55 also has a much later re-occupation.)

6.1.3 Alluviation

In addition to the aforementioned factors affecting the location of sites, ancient and modern, in the MHAS study area (i.e., concentration versus dissipation and topographic orientation), the very alluvium upon which the most prominent Pre-Islamic sites sit is also of no small concern to archaeologists. With respect to the Wādī Ḥaḍramūt, alluviation is important not only for what it informs us of the past, but also because of the difficulty that the alluvium imposes upon finding sites that are neither broad nor prominent. Orchard, in a 1982 article entitled "Finding the Ancient Sites in Southern Yemen," argued persuasively that the Bronze Age and early Iron Age predecessors to the 1st millennium Pre-Islamic culture in the Wādī Ḥaḍramūt are probably buried beneath the later silts.[11] Though I have come to find fault with certain elements of her discussion—such as the expectation that tell sites are actually buttes (see below)—I suspect that this core supposition is largely correct.

Orchard's argument relies heavily on Bowen's analysis of the ancient fields of the Wādī Bayḥān. Assuming a similar irrigation technology in the Wādī Ḥaḍramūt and its tributaries as is found in Wādī Bayḥān, and a correspondingly rapid rate of alluviation of 1m/150yrs,[12] she claims that the earlier developmental stages of Pre-Islamic Ḥaḍramī culture effectively buried themselves (and any traces of preceding Bronze Age cultures) underneath their own agricultural fields—and that future archaeologists should focus their attentions below the great Pre-Islamic fields in hopes of finding the purported predecessors. The SoYCE project eventually did find what the excavator Sedov claims is the indigenous antecedent culture to the "Classical" Pre-Islamic Ḥaḍramī culture, with radiocarbon dates between the late 2nd and the early 1st millennia BC. However, he also notes that those sites with early occupation are located at the edges of the wadis, rather than beneath the large Pre-Islamic sites in the middle of the wadis as Orchard predicted.[13] In this respect, Harding was correct in his assumption that the earliest agricultural settlements in the Wādī Ḥa-

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[11] Orchard, 1982.

[12] Bowen and Albright, 1958, p. 65.

[13] Sedov, 1996b, p. 80.

ḍramūt would most likely be found in the same places as modern sites—at the edges of the wadis, on gravel beds and spurs—and are probably obscured by them (rather than buried beneath their fields).

Given the long history of sayl irrigation in the Wādī Ḥaḍramūt and its tributaries, we might well then ponder how many sites of other periods are likewise buried beneath agricultural silts. Had Bowen's estimate remained constant, we would not expect to find any late Pre-Islamic or Early Islamic sites, because they would be buried under ten or more meters of subsequent deposition. That so many Pre-Islamic sites are in fact visible on or near the current surface (especially in the Wādī Dūʿan and Wādī ʿIdm) shows that the rate of accumulation slowed after the Pre-Islamic period. Probably, the rate of accumulation in the Wādī Ḥaḍramūt was never as fast as Bowen supposed, even at its peak. Brunner points out a cline of sorts, between Marīb, Wādī Bayḥān, and Wādī Ḥaḍramūt, in the degree of administrative centralization presupposed by their irrigation technologies.[14] He also cites 30m of deposition at Marīb, which implies a faster rate of accumulation there than at Wādī Bayḥān. This, in turn, allows us to suggest a correlation between the monumentality of the irrigation works and the rate of alluviation that they incurred.[15] And since sayl irrigation did in fact continue to the present day,[16] we can argue that the comparatively small scale with which is is practiced in the Islamic period results in lesser accumulation still—hence the accessibility of Pre-Islamic sites that would have been buried had irrigation practices on the large scale of the Pre-Islamic period continued into the Islamic period. (See Figs. 6.9–6.12 for illustrations of the different effects upon the landscape of ancient versus modern sayl irrigation.)

Failing to find many Pre-Islamic sites in the main Wādī Ḥaḍramūt, Van Beek proposed an alternative explanation for their absence, blaming floods and sayl irrigation for the destruction of

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[14] Brunner, 1997, p. 200.

[15] Bowen, in fact, posits this very same correlation between the monumentality of irrigation works and the rate of alluviation—arguing that Pre-Islamic irrigation practices resulted in better and more even distribution of sayl waters (and, hence, silt) than is obtained by less highly elaborate systems (Bowen and Albright, 1958, pp. 45–63), but this distinction was not accounted for in Orchard's hypothesis.

[16] See Serjeant, 1964 for a wide-ranging discussion of 20th century irrigation techniques.

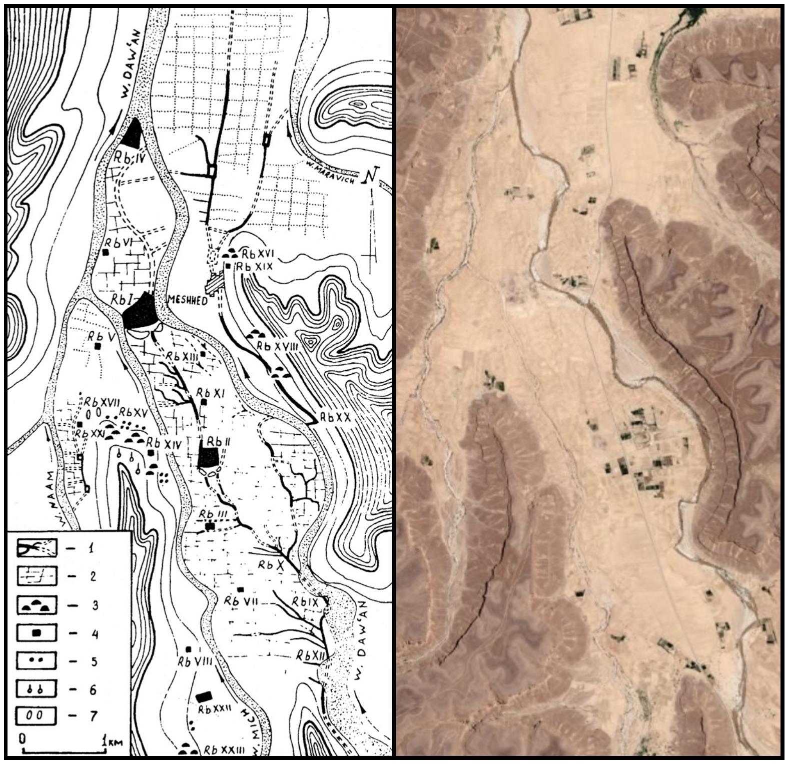

Figure 6.9: *Left:* Map of Raybūn, neighboring sites, and surrounding ancient fields in the Wādī Dūʿan (from Sedov, 1995b). *Right:* Recent satellite imagery of the same area. Note the extensiveness of the irrigation works, incorporating multiple settlements into a common hydraulic and agricultural system.

Figure 6.10: View of the ancient fields near Raybūn (in the lower right). Note the rectilinear grid to the north of the site, as well as the deeply eroded alluvium near the west escarpment, attesting to the organizational infrastructure and the rapid rate of silt accumulation in the Pre-Islamic period.

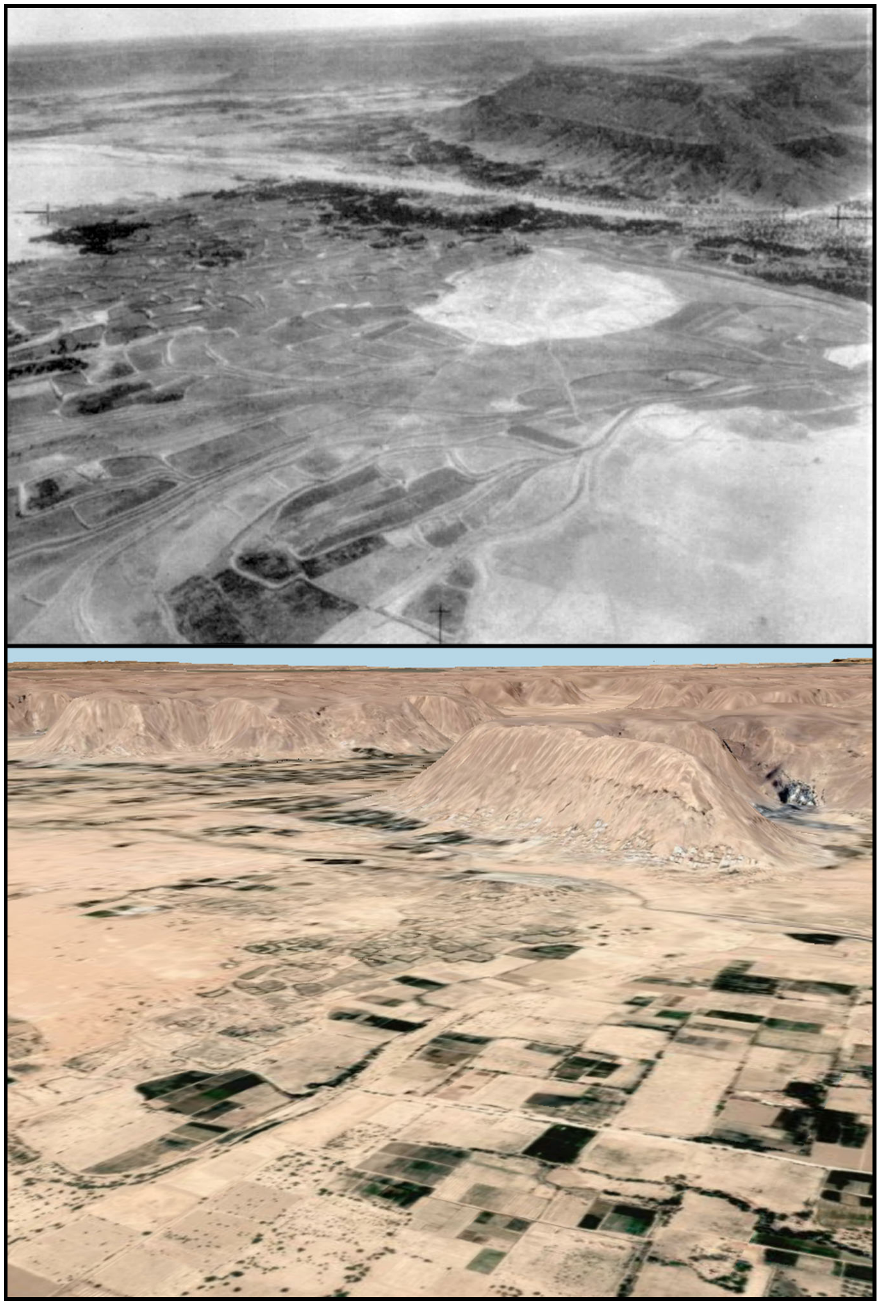

Figure 6.11: *Top:* Aerial view of the agricultural hinterland of Šibām (from Serjeant, 1964, Pl. II). *Bottom:* A similar view, based on Google Earth imagery. Note the organic configuration of the mid-20th century fields, reflecting the loose control over sayl irrigation, which as Serjeant noted, was mediated, town by town, by the moral authority of local elites. In contrast, note the rectilinear fields in the foreground of the early 21st-century image; these rely on mechanized pumps, rather than traditional sayl irrigation, and though they bear some trivial similarity to Pre-Islamic fields, are formed by very different means.

Figure 6.12: A second view of the fields surrounding present-day Šibām. Those closest to the city, especially to its north, conform to the typical organic pattern of Islamic period sayl-watered fields, whereas those farther to the west are modern well-fed fields.

the earlier sites—effectively washing, digging, and scraping away all traces of settlement from the wadi bottom.[17] To support this claim, he cites a single Pre-Islamic sherd recovered from a remnant silt butte in the main wadi and reports of Pre-Islamic sherds found some meters below the surface when wells are dug nearer Tarīm. This hypothesis—a reduction of the ancient surface in the west and a re-deposition in the east—should be fairly easily tested by a geomorphologist willing to explore the numerous wells in the area (or, perhaps more safely, the access ramps used for clearing them). Present MHAS survey data, however, undermines Van Beek's hypothesis, showing no overall pattern to the sites found partially or wholly buried (see Fig. 6.13). Not only does S-35 stand high above the surrounding plain in an area where there should be the greatest deposition, but the vicinity of Šibām is replete with Pre-Islamic sites (which, though generally small, are more numerous than the two paltry ones claimed by Van Beek; see Fig. 6.14). Moreover, he overlooks the relatively denser agriculture in the tributary wadis than in the main wadi. Given his model, we would expect there to be no remaining Pre-Islamic sites in these locations. Yet, it is in precisely these side wadis, and especially Wādī Dūʿan, that we find the highest concentrations

[17] Van Beek, Cole, and Jamme, 1963, pp. 538–539.

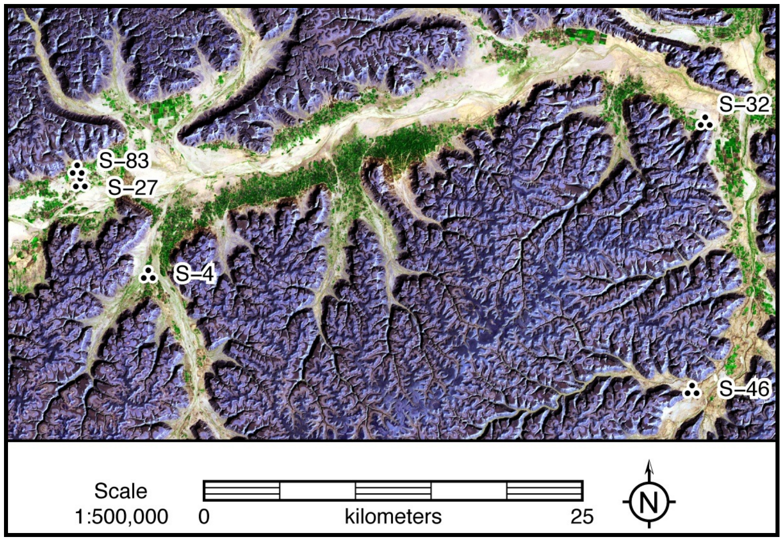

Figure 6.13: MHAS sites found partially or wholly buried in the alluvium. These sites are all Pre-Islamic in date, but do not give the sense of widespread destruction supposed by Van Beek. Note, too, that only S-4 and S-32 are wholly buried below the current surface, and not particularly deeply, either.

of plainly visible Pre-Islamic sites. Had the sayl irrigation techniques been equally destructive there as he proposes they are in the Wādī Ḥaḍramūt, we would expect no traces of Pre-Islamic settlements in those wadis where we in fact find them most easily. Thus, while some number of sites probably have been lost in the manner that Van Beek describes, I suspect that his data are localized phenomena rather than a broad trend across the main wadi.

Prior to any of this discussion of finding sites in and under the alluvium, however, Gardner examined the silts in the Wādī ʿAmd from a geological perspective.[18] There she found many meters of silt deposit, which she felt was mostly aeolian, but interspersed with water-laid clay and pebble strata. Below these "aolian silt" deposits (as she termed them) were gravel layers containing Levallois tools. Gardner's concern, however, was not for the agricultural silts, but rather the naturally formed silts and gravels below. Bowen, however, disagreed with her characterization of the silts, claiming, on the basis of comparison to the Wādī Bayḥān, that a greater proportion

[18] Caton-Thompson and Gardner, 1939, pp. 22–29.

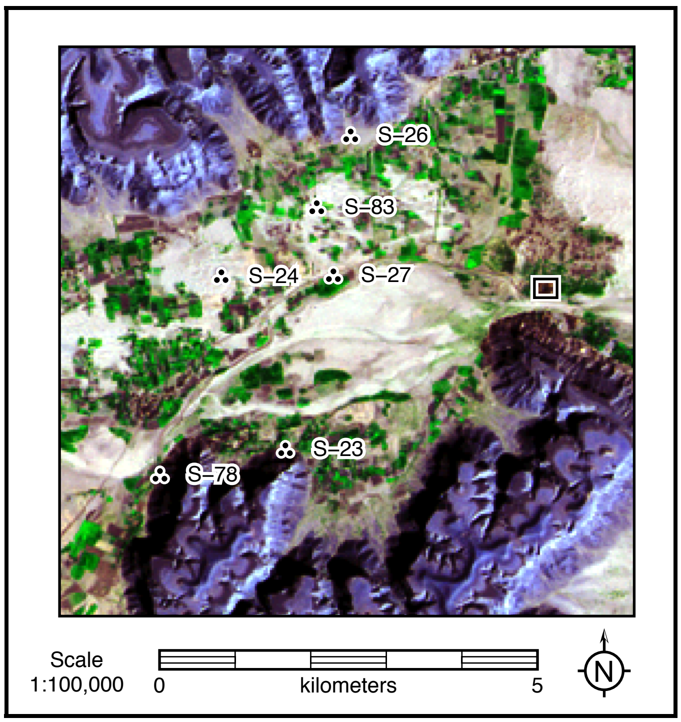

Figure 6.14: Confirmed Pre-Islamic settlement sites in the immediate vicinity of Šibām. In addition to these, a number of water management and graffiti sites were also found, as were a number with other settlements with possible (but not confirmed) Pre-Islamic presence.

was the result of irrigation agriculture than Gardner admits.[19] Though I cannot opine with any special authority on this dispute, I suspect that Gardner's analysis is correct. Specifically, during the 1999 season of the MHAS, I found in the farther reaches of the larger wadis evidence of two types of alluvium.[20] In cuts and washes in these wadis (visible most clearly in the Wādī Bin ʿAlī), the uppermost levels of silt were the same fine-grained, light pink, visibly stratified silts seen throughout the settled areas of the region and usually associated with Pre-Islamic and Islamic period settlements and irrigation installations. Below this fine silt, however, the silts are darker in color, coarser grained, and less visibly stratified. Gravel deposits are sometimes found on this lower alluvium, and where it is exposed, stone rings and cairns are sometimes found atop it (though, because they are not capped by the lighter alluvium, their relative chronological association is unknown, and may well post-date the formation of the gravel beds). It is likely, then, that the gravel corresponds with one of the gravel ledges described by Gardner, that the lower silts are natural, and that the upper silts are anthropogenic.

Anthropogenic silts also cause another peculiar effect in site preservation: pedestals. Noted by most expeditions to Raybūn and Mašġah, these sites present themselves as clusters of isolated mounds surmounted by structures—the structures, themselves, holding in place the silt upon which they were built, whereas the surrounding soil has been washed away. Bowen recorded a similar state of preservation among the ancient fields of Wādī Bayḥān, where deflation has left the remains of sluices and other stone built irrigation installations as small mounds atop the current surface. He also noted the relative lack of such erosion at Ḥurayḍah,[21] but probably overstates his case. Harding proposed rain as the agent behind these pedestals,[22] but this hardly seems likely in such an arid zone, and a combination of floods, wind, and human action seem most likely. Again relying on Bowen's study of Wādī Bayḥān, Orchard proposed that many or even most of the supposed tell sites in Southern Yemen are actually pedestals—villages founded entirely upon

[19] Bowen and Albright, 1958, p. 82.

[20] Zimmerman, 2000.

[21] Bowen and Albright, 1958, p. 79.

[22] Harding, 1964, p. 28.

the alluvium, the surrounding soils of which have washed away, leaving the villages isolated above their surrounding plains.[23] Though such pedestals are clearly present for individual structures (and even groups of structures, such as Houses I, J, and K at Mašġah),[24] there is no reason to suppose that it is applicable to entire villages; all tell sites in the Wādī Ḥaḍramūt thus far explored are, in fact, tells (and not buttes).

The distribution and disposition of the sites found by the MHAS, then, as well as those recorded previously by other projects in the Wādī Ḥaḍramūt and its major tributaries, strongly suggest that for the Pre-Islamic and Islamic periods we can presume an adequate rate of recovery, and discard previous notions of widespread destruction of Pre-Islamic and Early Islamic sites by later irrigation practices. Moreover, what we find for any given period from the mid 1st millenium BC onwards provides enough information to build reasonable interpretative models. This, of course is not to suggest that the region's geomorphology is static, but rather that its past 1500 years have not so degraded the previous 1000 to the point that those settlement patterns are hopelessly lost.

6.2 Site "Anchors"

Given the preceding discussion, what, then causes a site in the Wādī Ḥaḍramūt to form a tell? The most important aspect of this question is "what causes the inhabitants to abandon the typical dissipative settlement pattern in favor of a concentrated one?" In other words, what anchors a site to a given spot? For the Pre-Islamic, we can easily build an explanatory model based on a combination of defensive, economic, and administrative needs. Taking Šibām, as is often done, as a kind of living fossil of concentrated Pre-Islamic settlement, we note some of the features which make it distinctive: its rectangular plan; its defensive wall; its situation in the middle of the wadi; its tower houses; its uninhabited perimeter; and the very tell upon which it sits. Addressing each of these features in turn, we can begin to elucidate the various societal pressures that spur the

[23] Orchard, 1982, pp. 4–14.

[24] Seigne, 1982, p. 22.

adoption of concentrated settlement.[25]

6.2.1 Rectangular Plan

A rectangular outline and rectilinear grid is generally taken as an indicator of a planned settlement. Šibām, though a warren from the perspective of a pedestrian, suggests a planned settlement when seen from above (see Fig. 6.1). Hamdānī claimed that after the destruction of Šabwa by the Sabaeans in a series of conflicts from AD 225–230, refugees settled in Šibām.[26] I am unclear as to whether this implies that they founded a new city or settled in a pre-existing one, but had they founded an entirely new city, a rectilinear plan might not be unexpected. However, because of the number of smaller Pre-Islamic settlements in the region of Šibām—including Jūjah (S-24), which has levels nearly a thousand years older than this destruction of Šabwa,[27] and because I expect that these smaller settlements clustered around a regional center, I would expect that the earliest levels of Šibām are several hundred years older than the migration from Šabwa, and that the current town plan is not Pre-Islamic, but rather dates to the city's rebuilding in the 16th century AD.

Nevertheless, at Sumhurām we do have historical and archaeological evidence for an orthogonal planned city founded by Šabwa.[28] We also have clear orthogonal plans at the Pre-Islamic sites of Šabwa, Najrān, and Qarnaw—and Whitcomb also sees evidences of it at Qanaʾ (which, like Sumhurām, is also a planned port city).[29] (See Fig. 6.15.) But despite the fact that four of these

[25] Though Šibām is widely believed to have been founded in the Pre-Islamic period, the notion that it is a relic of that era is something of a fiction. Having been destroyed by floods in the 16th century, its current form dates no earlier than then (Breton, 1986; Lewcock, 1986b, p. 93). Though its sizable tell suggests that it was rebuilt in the same location, this is not entirely certain, and the Pre-Islamic "Šibām" may have been one of the other settlements in the area—or, even, the entire region near the confluence of the Wādī Jaʿaymah, Wādī Bin ʿAlī, and Wādī Ḥaḍramūt. Nevertheless, it is not unreasonable to point out its archaic features, based on comparison to excavated Pre-Islamic sites, and through them try to explain their common origins.

[26] Lewcock, 1986b.

[27] Hansen, Ochsenschlager, and al Radi, 2004, p. 59.

[28] Breton, citing J. Ryckmans' epigraphic work, dates this colony to the early 3rd century AD (Breton, 1987, p. 115). The excavators, however, date the earliest level of the site to the 3rd to 1st centuries BC, with a second phase in the 1st to 3rd centuries AD (Avanzini and Sedov, 2005, pp. 15–16). The discrepancy between the archaeologically and epigraphically determined dates suggests that either the wrong ruler is identified in the inscription, or else the later date refers to a reinforcement of a pre-established colony.

[29] Whitcomb, 1996, Fig. 8.

orthogonal sites (Šibām, Šabwa, Qanaʾ, and Sumhurām) are Ḥaḍramī, we cannot conclude that grid plans are necessary for concentrated settlement in the Wādī Ḥaḍramūt (though they probably encourage it); other concentrated settlements such as Raybūn, Jūjah, and Makaynūn show no obvious indications of grid plans, and the concentration of Qanaʾ and Sumhurām was not so great so as to form tells.

Whitcomb argues that the stereotypically chaotic Arabian city actually represents the coalescence of socially differentiated communities[30]—and it is highly likely that the larger Pre-Islamic sites in the Wādī Ḥaḍramūt and its tributaries formed in a similar fashion, concentrating for various reasons on a particular patch of land.[31] That the coalescence of socially differentiated groups is unlikely to have concentrated farming villages such as Jūjah (with their presumed lack of social differentiation) suggests to me that economic, environmental, or defensive forces predominated. The presence or absence of a rectangular plan, then—whether imposed at the founding of the settlement (as at Sumhurām), or evolved through centuries of occupation (as at Šabwa)—is largely irrelevant to the larger question of the development of concentrated settlement in the Wādī Ḥaḍramūt.

6.2.2 City Walls

Defensive architecture is a recurrent feature in Yemeni studies. In the highlands, towns are often located on seemingly inaccessible cliffs, and many cities (such as Ṣanʿāʾ) have massive city walls. Even Sayʾūn and Tarīm have had city walls—though now only a few remnants of these are left, having been dismantled as these cities spread beyond their boundaries. Šibām, by contrast, is severely constrained by its walls, and so resembles ancient Šabwa, Timnaʿ, and the Minean sites of Qarnaw and Barāqiš. Ancient Marīb's wall, by contrast, encloses an area many times larger than its tell—and I am unsure as to the density of occupation within those boundaries. This also

[30] Whitcomb, 1996.

[31] Breton suggests that the first settlement at Šabwa may have been tribal or family groups, arranged around a central market, each with its own district or quarter (Breton, 2003, p. 211). It strikes me that the existence of socially differentiated settlements in close proximity but not yet coalesced into an "Arabian" city could pose problems of archaeological interpretation. Given widely different economic activities of the various clusters, contemporaneity might be especially difficult to establish, and classification could be problematic too.

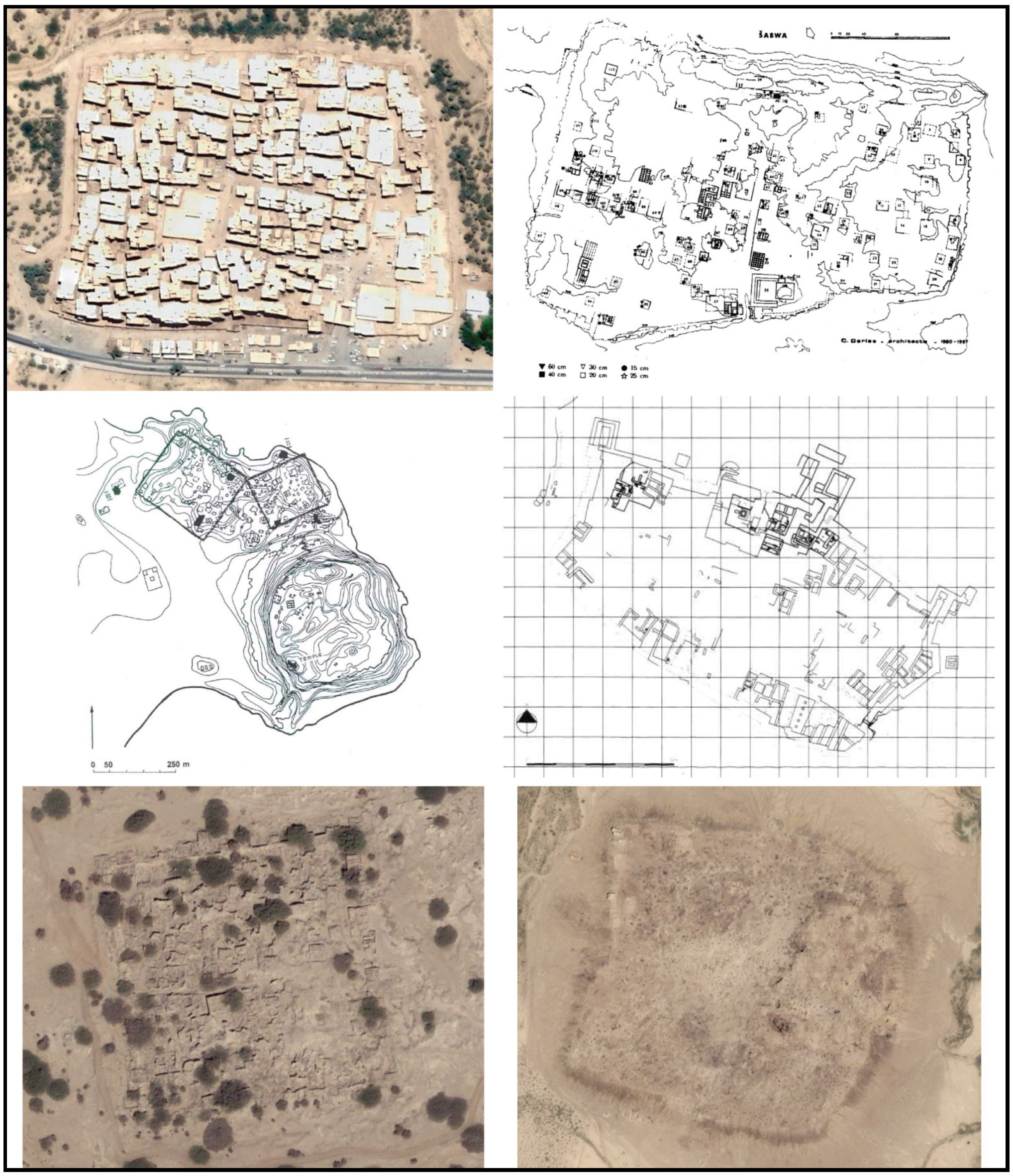

Figure 6.15: Maps and satellite images of Šibām and Pre-Islamic sites with rectangular plans (not to scale). *Top Row, L to R:* Šibām, Šabwa (from Breton, 2003, Fig. 6). *Middle Row, L to R:* Qanaʾ (from Whitcomb, 1996, Fig. 8), Sumhurām (from Avanzini *et al.*, 2002, Fig. 1). *Bottom Row, L to R:* Najrān, Qarnaw. Note that all of these sites, except for Qanaʾ, have rectangular city walls enclosing the urban area. (And that the rectangular grids of Qanaʾ are not nearly so well established as the other sites'.)

contrasts with Makaynūn, which had a city wall that only enclosed what the excavators consider to be the city's administrative and religious precinct, rather than the entire city.[32]

Šibām's tower houses are often taken to be defensive,[33] and the region's recent history of endemic warfare, as well as its numerous fortresses lends credibility to that hypothesis.[34] Many smaller Islamic settlements (probably mostly Late Islamic; see, for example, S-50, S-61, and S-64) can also be found clustering around fortresses, which are typically located atop a spur or boulder so as to dominate or guard the towns below. It is expected that such defensive measures—city walls and clustering for protection (regardless of whether or not that clustering was around a fortress)—would have encouraged the growth of concentrated settlement, and may have been a factor in the formation of Šibām and the walled Pre-Islamic sites in the Wādī Ḥaḍramūt and its tributaries. Sedov, however, claims that the majority of Pre-Islamic towns in the western Ḥaḍramūt were unwalled—so it can be seen that city walls are not strictly required for concentrated settlement in the Pre-Islamic period.[35] With respect to the local concept of "urban," it should also be noted that a village is referred to as a *qaryah* unless it is walled, in which case it is called a *madīnah*.[36] Though defensive architecture is everywhere visible, the provision of a city wall clearly enhances a community's prestige (or, perhaps, a sufficiently important community demands the additional protection of a wall). This same valuation probably held in antiquity, too.

6.2.3 Wadi Bottom Situation

Sites founded on the wadi bottoms and alluvium, whether they be villages (such as S-24 or those in Fig. 6.7) or cities (such as Šibām, Raybūn, and Makaynūn), seemingly break with the dominant topographic orientation of the majority of Ḥaḍramī sites. In the case of farming villages, the desire or necessity, on the part of the occupants, to live in immediate proximity to their fields, outweighs

[32] Mouton, Benoist, Schiettecatte, Arbach, and Bernard, 2006, p. 232–233.

[33] Breton, 1986.

[34] Serjeant's claim that Ḥiṣn al-Ḫibbah, perched on the jōl high above Šibām, protected the city from rifle fire, for example, provides a concrete example of a defensive function for these fortresses (Serjeant, 1964, Pl. III).

[35] Sedov, 1995a, p. 104.

[36] Damluji, 1992, p. 62.

the risk posed by floods. But, though this compromise is applicable to small settlements with little social stratification (wherein all the inhabitants work their fields in some capacity), it is dubious for mid to large sized towns, with their presumed greater social complexity and with many members of their populace engaged in non-agricultural occupations.

Since, in the case of Raybūn,[37] Šibām, and Makaynūn,[38] smaller villages cluster in the immediate vicinity of these larger centers, it seems likely to me that a more plausible explanation is that the larger centers dominate their immediate regions politically and economically, and that the smaller settlements congregate near those larger centers in order to partake (in whatever manner) of the benefits and services afforded by their proximity.[39] This would have the effect of promoting concentrated settlement in these central places, but does not explain their situation in the wadi bottoms. If these cities were once farming villages which grew, for whatever accident of history, to become central places, we would expect some number of towns at the edges of the wadis to have also developed concentrated settlement. Since Say'ūn and Tarīm are clearly the most important cities in their vicinity, it can be shown that centrality alone does not necessarily promote concentrated settlement (at least for modern communities).

6.2.4 Tower Houses

Šibām, of course, is most famous for its tower houses. Such dwellings, despite different construction materials and techniques, are relatively common throughout Yemen, and are generally considered to be defensive in nature. Indeed, within the Wādī Ḥaḍramūt and its tributaries, the most visible tower houses are the fortresses on strategic locations along the scarp—though one also finds occasional towers on the wadi bottom. These towers, regardless of their function or situation, typically stand alone, and are generally not common residences. In contrast, the Šibāmi tower houses are residential, as are those at Hajarayn in the Wādī Dūʿan (the other city in the region with significant numbers of tower houses)—and though the latter are not as tightly clus-

[37] Sedov, 1996a, p. 275.

[38] Mouton, Benoist, Schiettecatte, Arbach, and Bernard, 2006, pp. 238, 240.

[39] This pattern accords well with Albert Hourani's "agro-city" (Hourani, 1970, p. 16).

tered as the former (houses in Šibām being built up against one-another), they are clearly a city, as opposed to isolated structures.

Šibām, however, more closely resembles other ancient tell sites surmounted with recent tower houses than it resembles any other modern town in the wadi. It is perhaps most similar to Old Marīb, but the tell sites of Wādī Bayḥān also appear to be of the same general type.[40] The tell of ancient Šabwa, too, was apparently topped with tower houses—though it was probably never as dense as modern Šibām.[41] As is hinted at by Damluji's description of the rebuilding practices in Šibām, the presence of tower houses in a town is a likely feature of concentrated settlement. In all likelihood, concentrated settlement, particularly where constrained by city walls, would encourage the development of tower houses, in a self-reinforcing feedback loop.

6.2.5 Uninhabited Perimeter and Tell Formation

Whereas dissipated settlements such as Sayʾūn and Tarīm grow outwards, Šibām has grown upwards. This, then becomes the very crux of the matter for concentrated settlement and tell formation. As we have seen, the typical Ḥaḍramī settlement moves and spreads through time, sometimes encroaching upon its own agricultural hinterland. Concentrated Pre-Islamic sites such as Raybūn and Šabwa seem to have started in the 2nd millennium BC as ordinary agricultural villages—and although we do not have the horizontal exposure to ascertain their tendency to move, I will assume that they were dissipated settlements not unlike modern villages.

Urban Sayhadic culture, it is believed, was introduced to the wadi in the early 1st millennium BC—layering new cultural traits upon the pre-existing indigenous substrate. Pottery styles changed, Sabaean gods were introduced, and most importantly intensive irrigation agriculture commenced.[42] This last feature, elaborating upon preexisting technologies, but introducing to them a monumentality that did not previously exist, drastically changed the character of the local

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[40] The reader can judge the aptness of this comparison in the aerial photo of Old Marīb (Daum, 1987, p. 45) and Bowen's photographs of tell towns in Wādī Bayḥān Bowen and Albright, 1958, Figs. 2 and 3.

[41] Breton, 1987, p. 111; Breton, 2003, p. 204.

[42] Sedov, 1996b, pp.84–86.

settlement patterns. As settlements surrounded themselves with fields and expensive irrigation works, it became impossible for the inhabitants to move laterally without intruding upon the civic agricultural infrastructure. Moreover, the rapid alluviation caused by this intensive agriculture probably also served to reinforce concentrated settlement, since the high ground afforded by the tells themselves became the most sensible area for settlement. Thus we find the co-occurrence of major Pre-Islamic tell sites (Ḥurayḍah, Raybūn, Sūnah, Mašġah, and Makaynūn) and major irrigation works. Of course this, on its own, fails to adequately explain the existence of a minor tell site such as Jūjah—but I suspect that the major irrigation works serviced multiple settlements, a large center plus its satellites, rather than the central place alone (see Fig. 6.9, above). In that case, even the small villages would be under the same concentrating pressures as the larger cities, since they would be part of the same agricultural system.[43]

So, without fully explaining the reasons behind the predisposition for wadi bottom settlement, we can nevertheless see that the irrigation technology, more so than any other factor yet identified, does explain the relatively high proportion of concentrated sites in the Pre-Islamic period. But the influence of Sayhadic culture in the Wādī Ḥaḍramūt not only changed in irrigation practices, but also served to widen the world with which the Ḥaḍramīs interacted, and brought the second great pressure for concentrated settlement: the spice trade. Harding felt that urbanism in the early 1st millennium BC was a response to camel domestication.[44] However, because its roots are demonstrably older, I suspect that it accelerated and reinforced an existing trend, rather than caused it; that concentrated urban centers were already forming when the camel caravan trade routes were established, but that the wealth brought by the spice trade heightened the desire, on the part of the local elite of 1st millennium Ḥaḍramūt, to construct monumental irrigation works and monumental structures—both of which, by their durability, tended to freeze in place their associated settlements.

[43] This supposition is easily defended for the smaller sites near Raybūn, but is more on less solid footing in the area of Šibām, where we have found few traces of major Pre-Islamic irrigation works.

[44] Harding, 1964, p. 5.

6.3 Identifying the Pre-Islamic to Early Islamic Transition in the Material Record

The above discussion, then, does not change the overall picture of South Arabian culture history—irrigation and the spice trade are still taken to be the prime movers. It does, however, provide some context for the specific local trajectory of those changes through time. I contend that, by accepting the primacy of irrigation and the spice trade in the history of the region, as well as the reasonable reflection of past settlement in sites known archaeologically, we can more closely examine another vexing problem: the poorly-understood transition from the Pre-Islamic to Early Islamic periods.

> At the time of the Prophet historical information is, relative to the succeeding centuries, abundant, but my theory is that the Islamic conquests stripped Ḥaḍramawt of man-power for the campaigns and settlements in southern Iraq, Egypt, Tunisia, and later, Spain. I should, at least, not be surprised to find that archaeological evidence pointed to the abandonment of irrigated lands in the lower Wādī Ḥaḍramawt about this period, as a result of the neglect of irrigation works become uneconomic through the influx of wealth and departure of whole groups of people.[45]

Early in my studies, I read the preceding comment with some skepticism. While the abysmal state of our archaeological knowledge of the Islamic periods of the Ḥaḍramūt is lamented for both the interior and coastal regions,[46] the notion of such a depopulation seemed to me highly implausible. Especially given the high visibility of Pre-Islamic sites in the Wādī Ḥaḍramūt and its tributaries, I reasoned that a reconfigured settlement pattern—what I eventually came to term "dissipated" settlement—and the greater difficulty of finding such sites, seemed a more likely explanation. In that case, it would not be that the Early Islamic sites do not exist, but rather that they are smaller, more ephemeral and largely obliterated by current settlement on the wadi edges. The problem, then, would be of insufficient data due to inadequate archaeological methods, and it was hoped that the MHAS, by looking for those traces that were previously overlooked,

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[45] Serjeant, 1962, p. 241.

[46] Whitcomb, 1988, p. 180; Rougeulle, 2001, p. 212. See also Beeston's claim that inscription sources dry up about a half century before Islam, and Smith's claim that there are no Early Islamic Yemeni histories until the Umayyad or early Abbasid periods (Smith, 1987, p. 129).

would undermine the belief in a Ḥaḍramī Dark Age. While I stand by my characterization of the change in settlement patterns, I have recently come to accept Serjeant's view of the historical demographics.

6.3.1 Spice Trade and the Distribution of Urban Centers

Turning, then, to the role of the spice trade in shaping past settlement in the Wādī Ḥaḍramūt, we see that the archaeology reinforces our estimation of its importance. The locations of Pre-Islamic sites, their spacing and their concentrations, clearly show the imprint of the camel caravans.

Though the notion is obvious to any visitor of the Wādī Ḥaḍramūt, I contend that not only do the canyon walls encourage the topographic orientation of settlements and cult centers,[47] but that they also channelize traffic in a manner that makes it amenable to network analysis—and that we can treat the wadi system as if it were a riverine system.[48] Given that water, large settlements, fields, and orchards are all found in relative abundance on the wadi bottoms (as opposed to the jōl), it is here that we should expect to find the most important routes and destinations.

The great N–S wadis—Wādī Dūʿan, Wādī al-ʿAyn, and Wādī ʿIdm(major tributaries of the Wādī Ḥaḍramūt, flanking the west and east edges of the MHAS study area)—are the most densely packed with major Pre-Islamic sites. This fact should not be surprising, given that these are the major routes of commerce between the interior Ḥaḍramūt and the coast (in the Islamic era, but

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[47] Anthropologists wishing to explore the ways that physical geography informs worldview could well use these concepts of topography and constraint to better understand the conservatism and provincialism that are stereotypical of Ḥaḍramī society. One could argue, for example, that the physical geography to some degree underlies not only traditional architecture, settlement, subsistence, and travel, but also informs notions of private and public life, home and wider world. One could even go so far as to argue that these notions explain some of the impetus for the waves of emigration to East Africa, India, Indonesia, and Saudi Arabia—emigrants traveling abroad to seek their fortunes, but retaining long-lived contacts with their source communities, frequently across many generations.

[48] See, for example, Plog's discussion of network analysis for interpreting trade networks (Plog, 1977), and Peregrine's application of Graph Theory to Mississippian settlements as a stand-in for rank size comparison (Peregrine, 1991). In the case of the Wādī Ḥaḍramūt, the nodes are not necessarily discrete settlements, but usually clusters of small settlements in the shadow of one larger one.

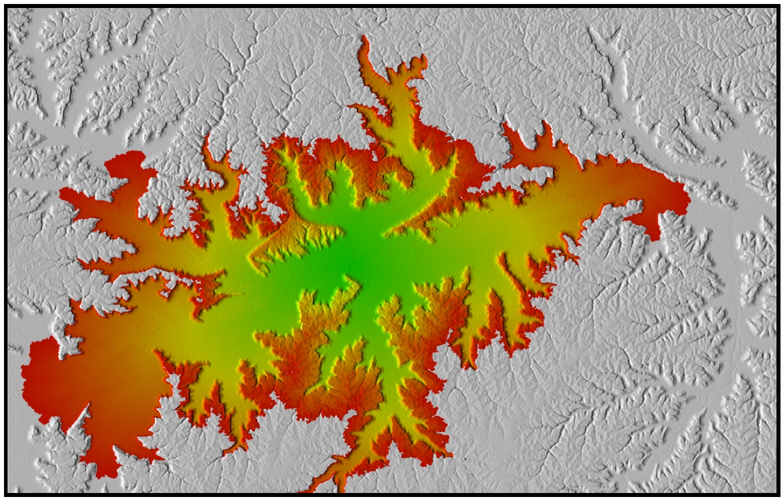

Figure 6.16: Cost surface depicting the effort expended to travel about 40km from Šibām, illustrating the channelization of traffic by the canyon walls. Note that the apparent ability to pass up the cliff faces is exaggerated by two factors: the softening of the contours by the 90m resolution of the SRTM source data, and the fact that the GRASS program used (*r.walk*) is designed to model human pedestrian traffic, not camel caravans. Camels cannot climb steep grades, so the actual cost surfaces should penalize travel up the escarpments even more than is shown here. The outermost red fringe along the wadi bottom, then, would be a reasonable distance for one day's camel caravan travel to or from Šibām, but the orange and red on the jōl would, in fact, be inaccessible to camel caravans.

presumably in the Pre-Islamic, too).[49] These wadis, stretching as they do so far to the south, provide natural avenues for long-distance traffic to or from the coast. Traveling northward, their southern ends, being their shallowest points, are the easiest points of access for camels and other traffic; and once in the valleys, the canyon walls funnel traffic, channelizing it and impeding egress (see Fig. 6.16).

Once in the wadi system, the caravans would travel in daily stages between successive stopping

[49] Since the Wādī al-ʿAyn and Wādī Dūʿan lie outside of the MHAS study area, and are extensively documented by the SoYCE project, the density of sites there is not reflected in the MHAS database or GIS—but the reader is referred to Sedov, 1996a and Sedov, 1996b for documentation. Likewise, the Wādī ʿIdm, though within the MHAS study area, is only lightly recorded by this project. Nevertheless, the French expedition's report (Breton, Badre, Audouin, and Seigne, 1982) gives good indication of the size of the settlements at Sūnah and Mašġah.

points. Translations of Pliny call these stopping points "stations" or "oases,"[50] but in the Wādī Ḥaḍramūt and its tributaries they are settlement clusters, transformed into man-made oases by the irrigation infrastructure. Assuming that Raybūn and Makaynūn (for the Pre-Islamic) and Šibām (for the Late Islamic, though perhaps also for the Pre-Islamic) are representative of the typical pattern, we may assume that the major urban center in any such cluster, though clearly larger than its satellites, is not orders of magnitude larger, as Marīb is in its neighborhood.[51] Presumably, these clusters provided caravansaries, watering holes, and other necessary services, while extracting tariffs that enriched the central cities, permitting them to grow, fortify their infrastructure, and build temples to enhance their prestige.[52] In such cases, one would expect secondary effects of this wealth upon the satellite settlements, tending to root them in place and concentrate them so that they form small tells such as those near Raybūn, Šibām, and Makaynūn.

Taking the oft-cited figure of 40km per day movement by camel caravans, we see patterns in the spacing of these settlement clusters that correlate nicely with known and presumed Pre-Islamic archaeological sites (see Table 6.1). Potts notes the conditional nature of caravan routes, affected as they are by seasonal and political conditions.[53] To these variables, I would add that the particular stopping points along the Wādī Ḥaḍramūt are probably also affected by the point of entry. Caravans entering the main wadi from either of the lateral wadis may well make initial stops at different locations than would caravans that have traveled the length of the wadi from, say, Qabr Hūd—so, given the varying needs of different types of caravans with different points of

[50] Secondary source citations of Pliny generally describe eight days' journey eastward from Šabwa ("Sabota") to the incense-bearing region. Traveling through the Wādī Ḥaḍramūt and Wādī al-Masīlah, this would put the caravans in the region of Qabr Hūd—somewhat to the west of Ḍofār, the region generally figured to be the source of most of the frankincense traded in antiquity. More troublesome, however, Pliny calls the incense-bearing region "Saba" (Bostock and Riley, 1857, XII.30). Probably, this reflects nothing more than Pliny's confusion, relying as he did on second-hand informants—but the seven or eight days' journey from Šabwa to Marīb does give one pause. Probably, his sources have conflated the travel time to Marīb—a major entrepôt—with the travel time to the source of the goods being traded. Given Pliny's other errors—place names, distances, and the occasional fantastic elements—however, we should take the eight days, as a concrete figure, with a grain of salt. Nevertheless, we do get a reasonable sense of the mode and scale of the caravan trade from his description.

[51] Brunner, 1997, p. 198.

[52] The connection between the incense trade, taxes, and the priesthood in Ḥaḍramūt is established by Pliny (Bostock and Riley, 1857, XII.33).

[53] Potts, 1988, pp. 127–128.

origin, we should expect some variability in the types and spacing of the sites where they stopped. Nevertheless, we do see an astonishing degree of regularity.

	Šabwa	Biʾr Ḥamad	Haynīn	Raybūn	Qaṭn	Šibām	Sayʾūn	al-Ġuraf	Sūnah	Tarīm	Ḥiṣn al-ʿUrr	Makaynūn	Qabr Hūd
Šabwa	-	110	160	185	175	200	220	245	265	255	290	295	330
Biʾr Ḥamad	110	-	50	75	70	95	115	140	160	150	185	190	225
Haynīn	160	50	-	25	20	40	60	85	105	95	130	135	170
Raybūn	185	75	25	-	40	60	80	105	125	115	150	155	190
Qaṭn	175	70	20	40	-	25	45	65	85	75	110	115	150
Šibām	200	95	40	60	25	-	20	45	65	55	90	95	130
Sayʾūn	220	115	60	80	45	20	-	25	45	35	70	75	110
al-Ġuraf	245	140	85	105	65	45	25	-	20	10	45	50	85
Sūnah	265	160	105	125	85	65	45	20	-	30	65	70	105
Tarīm	255	150	95	115	75	55	35	10	30	-	35	40	75
Ḥiṣn al-ʿUrr	290	185	130	150	110	90	70	45	65	35	-	5	40
Makaynūn	295	190	135	165	115	95	75	50	70	40	5	-	35
Qabr Hūd	330	225	170	190	150	130	110	85	105	75	40	35	-

Table 6.1: Distances (rounded to the nearest 5km) between Pre-Islamic sites in the Wādī Ḥaḍramūt and its major tributaries. 40km is the figure most often cited for an average day's travel by camel caravan, and so is highlighted in this table.

Starting at Šabwa, the westernmost point of the spice trade within the ancient kingdom of Ḥaḍramūt, proceeding eastward (against the direction of movement of the primary commodity), and ignoring the lateral wadis, we find three days' journey to Biʾr Ḥamad,[54] a fourth day to Haynīn (or another as yet unidentified site in the region), a fifth day to Šibām, a sixth day to al-Ġuraf or Tarīm, a seventh day to Ḥiṣn al-ʿUrr or Makaynūn, and an eighth day to the region of Qabr

[54] Maps of the spice route usually show the road to Šabwa leading directly up into the mouth of the Wādī Ḥaḍramūt. Given the dearth of sites between Šabwa and Biʾr Ḥamad, however, I suspect that the bulk of the traffic actually followed the wadis to the east of Šabwa, entering the main wadi south of Biʾr Ḥamad, rather than directly through its mouth. Travel times between these cities would have been nearly identical regardless of which route was taken, but there are many more sensible stopping points along the more southerly route. Note, however, that I have never been to the region of Šabwa, and the actual topography in these smaller wadis may not have been conducive to camel caravans.

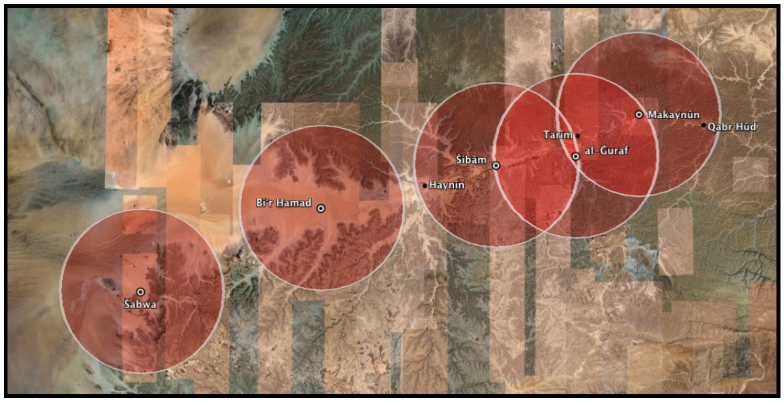

Figure 6.17: 40km circles, centered upon major "Classical" Pre-Islamic sites, indicating approximately one day's travel time. Gaps in the map but mentioned in the text (Haynīn and Qabr Hūd) are left because they lack substantial scientifically confirmed Pre-Islamic presence—but future study is expected to reveal settlements or caravansaries in these areas. Note, too, that though Šibām's existence is not archaeologically confirmed for this time period, the high concentration of small Pre-Islamic sites in its immediate vicinity strongly suggests that it was the local center.

Hūd.[55] Certainly the location of settlements is determined not only by the spice and incense trade—visibility, defensibility, agricultural viability, and a myriad of other less obvious societal pressures, all would have roles to play. Nevertheless, for the middle to late 1st millennium BC, the imprint upon the archaeological landscape of the camel caravans (as an economic base) is unmistakable (see Fig. 6.17).

6.3.2 Depopulation of the Wādī Ḥaḍramūt

Assuming, then, that we have a reasonably accurate picture of the distribution of sites (or, more accurately, site clusters) in the Pre-Islamic, and that the landscape has not changed radically since the end of that era, we can return to the question of the underrepresented Early Islamic period. Given the tendency in the Wādī Ḥaḍramūt of sites to dissipate rather than concentrate, we can expect that the removal of concentrating forces would result in more numerous, smaller, and more

[55] al-Ġuraf and Ḥiṣn al-ʿUrr are not settlements, but nonetheless are clearly important sites. The former commands a strategic intersection where Wādī ʿIdm joins the Wādī Ḥaḍramūt, and the latter dominates the Wādī al-Masīlah a few kilometers west of Makaynūn. These may have served as fortresses or taxation stations (and thus would have been stopping points in their own right), or they may have simply been outposts of the nearest major settlement—but, in either case, I suspect that they also served as caravansaries when needed.

dissipated settlements, mostly along the wadi edges. Because of the greater difficulty in finding such sites (versus finding tell sites), and because of the increased likeliness that they are hidden by modern settlements in the same locations, it is reasonable to presume that many sites are nearly invisible, archaeologically. It is notable, then, that given the ease with which we find earlier and later settlements, so few Early Islamic sites are actually found. We might expect an underrepresentation of such sites in the archaeological record, but not the near total absence from the MHAS corpus. Therefore, despite my initial skepticism, I now contend that this is no mere accident of post-depositional processes or surveying methodology, but an actual reflection of a depopulation of the Wādī Ḥaḍramūt in the late Pre-Islamic that lasted through the Early Islamic period.

Prior to the adoption of mechanized transport, travel times and methods in much of southern Arabia changed very little since the domestication of the camel.[56] Into the middle of the 20th century, camel caravans still supported a significant proportion of commerce in the Wādī Ḥaḍramūt.[57] The big difference, then, between the Pre-Islamic spice and incense trade and the trade documented by British administrators of the Aden Protectorate is not of method but of organization, commodity, and (probably) scale.[58] In other words, the centralization and organization of labor that created the great irrigation works of the Pre-Islamic operated similarly upon the camel caravans of the incense trade—and as the documented irrigation techniques of the 20th century reflect many of the same principles as their predecessors, so too the documented trade of the 20th century reflects its predecessors. But we see in both of these domains the degree of centralized

[56] Potts, 1988, p. 127.

[57] Ingrams cites figures of 32,000 camels yearly traveling from aš-Šiḥr to the interior and 14,000 camels arriving yearly at Šibām from points westward in the early 20th century—and the latter figure does not include the bulk of trade which arrived at Šibām from Mukalla (Ingrams, 1936, pp. 534 and 551).

[58] Ingrams describes the hiring of camel or donkey transport as an uneventful business transaction, with preset rates and itineraries managed by brokers in the coastal cities of aš-Šiḥr and Mukalla. The caravans, themselves, are led by bedouin of various tribal affiliations and carry a variety of goods. For the Pre-Islamic, it is generally figured that Mineans are the greatest long-distance caravaniers. As such, they were probably as independent of the kings and governors of the lands through which they traveled as were Ingrams' bedouin. (That is to say that their primary political allegiance was not to the host kingdom.) However, the kings of ancient Ḥaḍramūt, reigning over a broad territory, enforced certain routes and tithes militarily—thereby asserting a regulatory control over the traders. In the balkanized Wādī Ḥaḍramūt of the 20th century, it is likely that the bedouin would, under similar threats, simply divert their routes to another location permitted by their tribal affiliation—but, because of the stronger central government of the Pre-Islamic kingdom, it is doubtful that their forebears could have done so.

control and the monumentality of scale serving as a multiplier, causing extremely rapid alluviation on the one hand, and the greatest propensity for settlement at regular intervals along the wadi bed on the other.

Šibām, as the most concentrated modern city in the Wādī Ḥaḍramūt, emphasizes this point. Into the 20th century, and for the preceding centuries, it was the primary mercantile center in the entire Ḥaḍramūt.[59] As such, the Quʿayṭī and Kathīrī sultans vied for control over it until the middle of the 20th century, when the center of political and mercantile power in the wadi shifted eastward to Sayʾūn.[60] Here, and nowhere else in the wadi, the centralizing force of the camel caravans persisted in a form approximating that of the Pre-Islamic period. Šibām's persistence, attributable in no small part to its role as an entrepôt (though see the discussion above for other factors) further underscores the general decline between the height of the Pre-Islamic, with its numerous concentrated settlements, and the Early Islamic.

The growing importance of the coastal route of the spice and incense trade, followed by their ultimate defeat to the Himyarite empire, effectively ended the inland trade route through the Wādī Ḥaḍramūt. To be sure, caravans still formed an important part of the local economy (as Ingrams' figures attest), but they lacked the centralized regulation that characterized them in the Pre-Islamic period. The first shift in settlement patterns in the later Pre-Islamic occurred in the 1st century BC in the western Ḥaḍramūt. There Sedov sees destruction levels at many sites, followed by the appearance of villages along the scarps.[61] Given the date of this change, the presumption is that the destruction there was at the hands of Qatabān, who were often in direct competition with the kingdom of Ḥaḍramūt.[62]

In the 2nd century AD, Qatabān itself was finally defeated by Ḥaḍramūt, which had by then

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[59] Serjeant, 1962, p. 239; Lewcock, 1986b, p. 86.

[60] Damluji, 1992, pp. 54–56.

[61] Sedov, 1995a, p. 112.

[62] Sumhurām, too, undergoes a period of decline in the late 1st century BC or early 1st century AD, which the excavators suggest may also be due to Qatabanian aggression (Avanzini and Sedov, 2005, p. 16), and Makaynūn apparently is abandoned at around this time (Mouton, Benoist, Schiettecatte, Arbach, and Bernard, 2006, p. 240).

regained much of its prior stature.[63] The sacking of Šabwa in the 3rd century AD by Sabaʾ was short-lived, but it eventually was occupied by Ḥimyar by the 4th century, and its realm was then incorporated into the Himyarite Empire.[64] Military conflict, however, was not the only trend across these centuries. The opening of the sea route of the spice trade caused a decline in the importance of camel caravans running down the length of the Wādī Ḥaḍramūt, with a concomitant increase in long distance trade with India and a growing importance of East African contacts. We see this trend in the histories of the Ḥaḍramī port cities of Sumhurām and Qanaʾ. The former, an outpost in Ḍofār founded by Šabwa prior to the invention of monsoon seafaring, and managed as a collection point for frankincense, despite the brief decline mentioned above, flourished until the late 4th or early 5th century AD. Qanaʾ, which may have roots in the middle to late 1st millennium BC, served as a major port from the 1st century AD until the late 6th or early 7th century, and especially during the 3rd to 6th centuries.[65] Both of these Ḥaḍramī cities followed a different trajectory than those in the interior, retaining their importance even under Himyarite rule. With respect to the settlements of the interior Wādī Ḥaḍramūt, the disruption of the strong central authority required to build and maintain the monumental Pre-Islamic irrigation infrastructure undermined the viability of that infrastructure, and removed the single greatest factor supporting concentrated settlement. The early centuries AD, then, witnessed the dissolution of nearly all the concentrated settlements in the region.

But Ḥimyar did not simply adopt a preexisting trend away from inland routes and toward the sea; as part of the consolidation of its territory and economy, Ḥimyar promoted certain routes and actively discouraged others. Seland argues, for example, that the early Ḥimyar kingdom sacked ʿAdan in order to divert traffic from that city and consolidate trade through the Red Sea port of

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[63] Müller, 1987, p. 51.

[64] Inscriptions Iryani 13 (Beeston, 1976, pp. 47–48) and Ja 656 (Jamme, 1962, pp. 161–162), from Marīb, respectively, commemorate the sacking of Šabwa and the conquest of Ḥaḍramūt.

[65] Sedov, 1992, pp. 125–126. The excavator, however, points out that no actual archaeological evidence has been found to support the historical claims of the earlier dates for Qanaʾ.

Muza.[66] Since the former city faced rival Qatabān more than Ḥimyar, and since the latter was fully within Himyarite control, the oddity of attacking one's own city may have had a sensible rationale. If this scenario is true, and Ḥimyar destroyed one of its own ports to divert traffic to another, more firmly in its own control, then it perhaps also explains their sacking of the towns of the Wādī Ḥaḍramūt—towns which were by then nominally Himyarite.[67] Rather than permit the spice and incense trade to travel through the main wadi—which is somewhat porous, through its northwards tributaries, into territories not under Himyarite control—the Himyarite kings may well have chosen to destroy the remnants of the inland route and force traffic from the Arabian Sea to enter via the port at Qanaʾ, so as to prevent losing it to raids and smuggling in the interior.[68]

Notwithstanding Müller's observation of the rapidly declining importance of Ḥaḍramūt and Ḍofār in Himyarite texts from the 4th century onwards,[69] Sumhurām must have remained a valuable port for the collection and transshipment of incense, and was thus permitted to continue in its earlier role by the Himyarites (though perhaps with a diminished capacity). Cargo from that port joined African and Indian goods at Qanaʾ for transportation inland via Šabwa and the other

[66] Seland here refers to the "Sabaʾ-Ḥimyar" kingdom (Seland, 2005, p. 273), but Beeston had already disposed of the notion of such a dual kingdom (Beeston, 1975, p. 4). Others have used "confederacy" or "alliance" to discuss the nascent Himyarite state (see Tindel, 1994, pp. 276–277), and it may be to this early pre-state Ḥimyar that we should attribute the sacking of ʿAdan. I, however, use the term "kingdom" because the ability to destroy a major port city and effectively prevent its reestablishment indicates to me a territorial control of regional polity that is stronger and more organized than a mere confederation of small tribes. The date for this sacking, while not certain, is suggested by the *Periplus* at the late 1st century BC or the early 1st century AD (Casson, 1989, p. 65)—after the 115 BC commencement of the "Himyarite Era," but well before the rise of the Tubbaʿ kings.

[67] See Breton, 1987, p. 115, apparently referring to texts CIH 948 and Ja 665 (Jamme, 1962, pp. 373–375), for military conflict between Ḥimyar and the remnants of Ḥaḍramūt in the 4th century AD.

[68] The northern tributary wadis, especially the Wādī Sarr, remain smugglers' routes to this day. The MHAS was obligated by the Yemeni government to take a military escort when visiting the Wādī Sarr, for fear of kidnapping or other unfortunate contact with smugglers.

[69] Müller, 1987, p. 52.

Himyarite caravan stations.[70] The interior Ḥaḍramūt, however, formerly middlemen in the Spice Trade and producing few items of value to Ḥimyar, became at best irrelevant to the empire.

The demographic shift, then, which we see in the Wādī Ḥaḍramūt of the late Pre-Islamic period is not simply an accident of history, reflecting an economic base buffeted by external forces (namely, the improvements in seafaring and the later decline in Mediterranean Sea appetites for Arabian luxuries). Instead, I propose that it is the result of a very deliberate campaign by the Himyarites to undermine an entire region. To be sure, I am not proposing an ongoing military subjugation of Ḥaḍramūt by Ḥimyar, but rather that Ḥimyar's annexation of Ḥaḍramūt inexorably changed the latter—and did so in a way that affected the population and settlement patterns of the Wādī Ḥaḍramūt for centuries beyond the initial conquest. Since the Wādī Ḥaḍramūt lacks the resources to sustain large populations without income from the outside,[71] and since that outside income, carried by the the spice and incense trade, was the major economic base *and* a major force for concentrated settlements in the Pre-Islamic, the redirection of that trade away from the interior, tipped the scales against an already precariously perched system.[72] The Ḥaḍramī population, already dispersing from the wars with Qatabān, appears to have dropped precipitously in the last

[70] George Hourani suggests that, following the discovery of the monsoon passage to India, ships destined for southern India would depart from "Ocelis" (at the the Bāb al-Mandab strait) or Qanaʾ, whereas ones destined for northern India would coast as far as "Cape Syagrus" (i.e., Rās Fartāk) before cutting across the Indian Ocean (Hourani, 1995, p. 29). The *Periplus* gives "Moscha Limên" (i.e., Sumhurām), on the eastern edge of the Qamr Bay 275km further on, as the last stopping point for such traffic (Casson, 1989, pp. 69–70 and 172–173)—but this is a minor discrepancy. An interesting side note concerning the integration of Qanaʾ with the Himyarite empire is the change noted by the excavators in its 3rd and 4th century AD assemblage: at that time, we see a shift in the port city's material culture away from the eastern connections and toward Africa (Sedov, 1992, pp. 127–128). This change reflects not only the end of the trade in spices and incense bound for the Mediterranean Sea, but also the increasingly intertwined and contentious relationship between Ḥimyar and Axum. The African materials at Qanaʾ attest to its integration into the Himyarite world.

[71] Freitag, 1999.

[72] Chaos Theory and Complexity Theory, which garnered much attention in the late 1980s and early 1990s, were at that time frequently invoked in the popular scientific press to explain the collapse of ancient societies. Most effectively argued by Tainter (Tainter, 1988), the theory held that as the complexity of a system—social or otherwise—grew, it required additional complexity to maintain itself. Beyond a certain point, a perturbation could disrupt the system in a manner that would cause it to unravel—sometimes wildly out of proportion to the perturbation itself. The settlement collapse of the Wādī Ḥaḍramūt in the late Pre-Islamic is certainly amenable to such an explanation.

century or two prior to Islam. The Himyarites no doubt accelerated that decline.[73]

In the 6th century AD, the Kindah tribe, based in Qaryat al-Faw, assumed control of much of the wadi.[74] The similarity of the the architecture and material culture of Qaryat al-Faw with that of Pre-Islamic Ḥaḍramūt suggests a strong cultural affinity as well as a likely regional competitor to the Himyarites' control of caravan trade. If, as I posit, the Himyarites feared the loss of high value goods through the northern tributaries of the Wādī Ḥaḍramūt, then the Kindah would have been the most likely recipients of those goods. Kindah's relationship with Ḥimyar was likewise complicated; initially they were vassals to Ḥimyar, but later as their strength grew, they were regularly beset upon by the empire,[75] and by the time of the Prophet, they were the dominant political force in the wadi.[76] Their dominance, however, did not last long, and dominion over the Ḥaḍramūt passed from regional polity to regional polity until it came under the control of the Rasūlids in the late 13th century.[77] This chaos sapped the wealth of the region, inhibited

[73] That Šibām, Sayʾūn, and Tarīm, all of which have supposed Pre-Islamic roots, as well as Ḥiṣn al-ʿUrr and Dammūn, which flourished in the terminal Pre-Islamic under the Kindah, persisted through this period does not necessarily undermine this hypothesis. Of these, Šibām is the only concentrated settlement, and Ḥiṣn al-ʿUrr—which (as its name states) is a fortress or fortified palace, rather than a population center. The fact that the latter of these is the only site with substantial archaeological finds from the period also calls into question the size of the Pre-Islamic population in the Wādī Ḥaḍramūt; though we can be reasonably sure that soundings into Šibām's mound would yield evidence of Pre-Islamic occupation, we can be less sure of Sayʾūn, Tarīm, and Dammūn, which all conform to the normal dissipated settlement type, and show no immediately obvious locations for excavations into their Pre-Islamic past. Earlier Pre-Islamic sites, by contrast, are plentiful. Jūjah (S-24), which was probably finally abandoned in the 5th century AD, was by this time only one or two farmhouses atop the tell. There may well be a gap in the occupation of the site prior to these Level I houses, and there is little reason to presume that they conform to the concentrated settlement pattern—unlike earlier levels there, which were concentrated (having formed the tell upon which the Level I structures sat). Jūjah, then, provides another data point in support of the population retraction in the Wādī Ḥaḍramūt during the terminal Pre-Islamic.

[74] von Wissmann and Höfner, 1952, p. 339.

[75] al-Ansary, 1982, p. 16.

[76] See Beeston's "Harlots" article for a colorful chapter in the relations of the Caliphate, Kindah, and the Ḥaḍramūt (Beeston, 1952) and Madʿaj's discussion of the political machinations that surrounded it (al-Madʿaj, 1988, pp. 47–55).

[77] Ibn Ḥamīd, 2003, pp. 506–507; See, also, Lewcock's outline of the histories of Šibām and Ḥaḍramūt for details of this tumultuous era (Lewcock, 1986b, pp. 31–34 and 127–128).

population growth, and contributed to a provinciality that is evident in its material culture.[78]

If a large proportion of the population did actually depart for the Muslim Conquest, as is asserted (and there is no reason to believe that this is not so),[79] its effects on the archaeological map of the Wādī Ḥaḍramūt are undetectable below the prevailing trends. Certainly, the great emigration to India and Indonesia in the 19th and 20th centuries have left a series of highly visible ghost towns. Though the passage of time would reduce the visibility of sites abandoned for the Conquest, it alone does not adequately explain the missing Early Islamic; one would expect a greater number of ghost towns from that period. So while I present this hypothesis with all the usual caveats,[80] I feel that it is now safe to say that the archaeological data reaffirms what historians have long said about the Wādī Ḥaḍramūt in the Early Islamic period: it is a backwater—not simply with a material culture that lacks the monumentality and durability of the preceding era, but also economically impoverished, incapable of supporting the population that it previously could, and thrown about by far stronger regional actors. Diamond's recent popular work defines "collapse" as "a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time."[81] By this definition, which is largely testable archaeologically, we can comfortably call the terminal Pre-Islamic in the Wādī Ḥaḍramūt a period of societal collapse—and historians' view of the Early Islamic period there has its roots in the preceding centuries.

[78] As opposed to the ceramics of the Pre-Islamic period, those of the Islamic era in the Wādī Ḥaḍramūt are local forms and decorations without obvious reference to the outside world (see Ch. 4, above)—an insularity of its material culture that reflects the presumed isolation of its Early Islamic history and the general ignorance of its historiography for this period. (See al-Madʿaj, 1988, p. 104, for a discussion of this latter point.). Note, too, that Southeastern Arabia saw a similar decline in the terminal Pre-Islamic, likely caused by political fragmentation in the wake of the Sasanian Empire (Kennet, 2007). So, whereas my concern is with the trajectory of settlement changes in one particular corner of Southwestern Arabia, it can be viewed as a local manifestation of a much wider historical trend.

[79] Smith, 1954, p. 467; Serjeant, 1962, p. 241.

[80] See, for example Nelson and Hegmon, 2001 for a cautionary tale guarding against interpreting a demographic shift away from large settlements as a collapse in the American Southwest.

[81] Diamond, 2005, p. 3.

6.4 General Conclusions and Suggestions for Future Work

Additional archaeological work to verify or falsify these conclusions is certainly warranted, especially in light of the never realized third phase of the MHAS. Nevertheless, it is hoped that the present study will provide useful data for future archaeologists. At the very least, this study highlights the current state of our archaeological knowledge for the Wādī Ḥaḍramūt, and suggests future work that should be undertaken. My remaining comments, then, will address some of these concerns.

6.4.1 Regional Survey

Any chance of finding Early Islamic sites in the Wādī Ḥaḍramūt will come from more intensive survey than that which I accomplished. The description of Phase III of this project (see 2.1.3, above) provides a viable outline for future survey work. Though I would like to lead such a project, I would gladly yield it to any other researcher who could seriously mount the effort.

Besides simply listing sites of various time periods, a well-run survey would build an accurate geological and geomorphological map, improving our understanding of when, how, and why the landscape changed through time. Rapidly improving instrumentation and telemetry would permit more finely detailed maps, and possibly also the construction of sophisticated GIS models incorporating topography, hydrology, transportation, and cultural significance on a regional scale.

6.4.2 Ceramic Seriation

Though reasonable ceramic seriations currently exist for the 1st millennium BC, data for the late Pre-Islamic and the Early Islamic are sparse. And though one can easily distinguish Pre-Islamic from Islamic ceramics, in broad terms, it is an almost uselessly coarse distinction. One of the explicit goals of the collections carried out by Van Beek was to form the backbone of a regional ceramic sequence for the Islamic periods in the Wādī Ḥaḍramūt.[82] For that work I am deeply

[82] Van Beek, Cole, and Jamme, 1963, p. 540.

indebted, since Whitcomb's examination of the collections does indeed form the bulk of the comparative material for my study of the MHAS ceramics (see 4). Nevertheless, the present work only marginally improves the situation. A useful ceramic sequence for the Islamic periods in the Wādī Ḥaḍramūt needs stratified excavation. The provinciality seen in the current assemblage and the dearth of imported wares (aside from the ubiquitous Chinese porcelains of the Late Islamic period), suggests that comparison to sequences from sites outside the wadi system is not terribly productive. So while "more excavation is needed" is a common lament, it is critical if we are to understand the chronology of the Islamic periods in the Wādī Ḥaḍramūt.

6.4.3 Excavation

A number of sites in the MHAS study area would benefit from archaeological excavation—whether as an attempt to save them from imminent destruction, or for their potential contribution to questions of the historical development of the Wādī Ḥaḍramūt. I present below a brief overview and explanation of the sites that I feel would be the most beneficial recipients of additional inquiry, organized by time period.

Prehistoric Sites Most prehistoric sites found by the MHAS were simple cairns and alignments. Unfortunately, these features do not normally yield much datable material (though a typological study, along the lines of Vogt and Sedov's survey for Canadian Occidental,[83] would be useful). One cairn that was notable for its large size and intact condition, S-80, would be an interesting subject for a short excavation, hopefully providing datable materials. Sites S-65 and S-68, from which the large bifacial tools were recovered, also deserve careful mapping (at a minimum), and limited excavations there would likely be very beneficial even if they did nothing more than assign a date to the objects. Likewise, excavations at S-53 (also in the Wādī Bin ʿAlī) could test that site's similarity to Šiʿb Munaydar, and explore the culture's economy and geographic extent. The most dramatic prehistoric site in the region, S-73 (al-Markazāt), though it has been visited and published (in brief) by at least two other

[83] See Vogt and Sedov, 1994?.

archaeological surveys besides mine, has never been properly mapped. Excavation of this site might be a sensitive matter, owing to the site's visibility, but a serious non-destructive documentation project is a must. Finally, S-15, with its enigmatic architecture, is the only likely Bronze Age site in the study area. The juxtaposition there between the small, but apparently extremely old, rectangular buildings and the cairns on the neighboring hillside warrants additional study in hopes of determining this site's actual age.

Pre-Islamic Sites Pre-Islamic sites, of course, have been given the greatest archaeological attention in the wadi. Owing to their visibility and situation near modern population centers, however, they are in the greatest danger of looting and other forms of destruction. The house at site S-26, actively being scavenged, is apparently an elite residence or administrative structure of the 1st century BC or early centuries AD. Its careful excavation, then, would gain us insight into this critical period of Ḥaḍramī history, when the kingdom was at its peak and embroiled in conflict with Qatabān. It would also serve to record this site before its inevitable destruction. Site S-23, also largely destroyed by bulldozer activity, would likewise benefit from salvage excavation before it is lost entirely—as would S-78, which is being encroached upon by modern construction. Though it is not under immediate threat, its proximity to the main trunk road suggests that a mid-sized excavation project could be undertaken over two or three seasons at S-27, in advance of its probable eventual loss below modern construction. On the other hand, full-scale operations can (and should) be undertaken at the major Pre-Islamic urban centers of Sūnah and Mašġah in the Wādī ʿIdm, as complements to the prior and ongoing work at Šabwa, Raybūn, and Makaynūn; these projects would require a major commitment of time and money, spanning multiple years. Lastly, conservation and documentation (ideally including additional limited excavation) should be carried out at S-35 (al-Ġuraf)—which, though not under any obvious threat, is clearly an important site in its own right, and worthy of investigation and protection.

Islamic Sites Since unoccupied Islamic sites (prior to the Late Islamic period) are less numerous than Pre-Islamic sites, and since they have not been systematically studied in the Wādī

Ḥaḍramūt, excavation of a small number of them would provide a wealth of information. S-56 (Qalʿat al-Ḥabūẓī), with its enigmatic pottery, would clearly benefit from further study. Petrographic studies of its ceramics, along with soundings, could determine whether the fortress was of a foreign power or of local origin. At the least, if entirely local, the materials would improve our chronology of the Early Islamic and/or Middle Islamic periods in the Wādī Ḥaḍramūt; on the other hand, if the materials proved to be from Ḍofār (as is suggested in the site's name) or the Tihāma (as is suggested by the combed ceramic decoration), we would not only improve the regional chronology, but also gain insight into the region's tumultuous history. Though less dramatic, excavation of the Islamic portion of S-83 would improve our understanding of village life in the Middle Islamic period. Excavation of it mosque (A-32), in particular, would improve the architectural history of the wadi, given its similarity to mosques in Bōr and Tarīm. Lastly, *and certainly not least*, excavations should be carried out at Šibām. Soundings into this city's tell, more than any other site in the region, would improve the ceramic sequence of a long span of the wadi's history. Given its dense urban nature, excavations there would be tricky, but a preliminary archaeological program has already been proposed for UNESCO,[84] and the authorities at the Sayʾūn Museum have expressed tentative interest in such a project.

6.4.4 Conservation and CRM

A short list of processes describes the majority of damage to sites witnessed. The authorities in Sayʾūn, though professional and dedicated, lack the resources to effectively stem the destruction all of the sites in their jurisdiction. Thus, where mitigation is not possible, an awareness of these processes permits future archaeologists to focus quickly on the sites that are most at risk. The following list can provide a starting point for such work.

Encroachment In my estimation, the encroachment of fields and settlements is the single greatest threat to sites in the Wādī Ḥaḍramūt— particularly given the rapid growth in new construc-

[84] Lewcock and Heyman, 1982, p. 20.

tion, and the use of bulldozers to clear land for that construction. Prior to its discovery by the MHAS project, most of S-23 was cleared by bulldozer to expand the nearby agricultural fields. Site S-76 was also cleared in this manner sometime between 1995 and 1997. Satellite imagery also shows bulldozer scars around many of the Pre-Islamic sites at the wadis' edges, and I fear that many more will be lost in the next decade. And even though it is a known site which does not seem to have been subjected to earthmoving activities since the end of the NYU excavations, satellite imagery also shows that Jūjah (S-24) has, since 1995, been converted almost entirely to fields which now edge right up to the walls of our former trenches. Similarly, the expansion of Sayʾūn and Tarīm (in particular), as well as smaller towns and villages, has resulted in the loss of archaeological sites. Population growth, coupled with the "build, move, decay" mode of dissipated settlement expands and shifts the boundaries of modern settlements with little regard for archaeological sites. The only way that this effect can be mitigated is through careful survey at the margins of these cities and prior to other new construction, in hopes of finding sites before they are razed or engulfed.

Mining of Soils In the same way that Egyptian sites are mined for "sebakh," archaeological sites in the Wādī Ḥaḍramūt are sometimes mined for their soils, which are use to enrich agricultural fields. Mašġah, according to Seigne was damaged in this manner,[85] and one third of S-24 was removed, prior to our excavations in 1994, to fertilize nearby fields.[86] Though I do not know how common this practice is, when employed it is exceedingly destructive.

Scavenging There is a long tradition in all of Yemen of scavenging Pre-Islamic sites for construction materials. Site S-26 is actively being mined, and the foundation stones of A-28 are being removed and recut into column drums to furnish newly-built houses. The largest foundation stones of the Level I house at Jūjah (S-24) have also been removed between the end of the NYU excavations in 1995 and my re-examination of the site in 1997. Anecdotal evidence suggests that some sites have been utterly dismantled in this manner.

[85] Seigne, 1982, p. 22.

[86] Hansen, Ochsenschlager, and al Radi, 2004, p. 43.

Erosion Though I believe that Orchard and Bowen overrepresent its importance, sites founded on the Pre-Islamic agricultural silts are susceptible to loss from erosion. This represents an ongoing problem, but not one directly attributable to human motives. In some places it may be desirable to divert runoff so as to better preserve the archaeology.

Burial By Sand Dunes Sites S-13, S-24, and the Islamic portion of S-83 are all partially swallowed by sand dunes. While no direct action can be recommended, an awareness of these dunes and their movement may permit us to document sites before they are fully engulfed or (alternately) to find more sites that are still only partially hidden or are newly exposed.

Looting Fortunately, I have not found any direct evidence of organized looting in the Wādī Ḥaḍramūt. However, the occasional appearance of unprovenienced antiquities suggests that it may in fact occur.[87] Other parts of Yemen are actively looted, so an awareness of the problem, and an appeal to the GOAM to monitor the situation is recommended.

[87] See, for example, the acquisition of O-12 (Section 5.6, above). More alarming, however, in 1999 a bronze statue foot, twice life size and Roman in appearance, was brought to the Sayʾūn Museum by a man from Šabwa province. He may have deliberately excavated the treasure, or may have stumbled upon it accidentally in the course of some other destructive activity, but his hope to sell it for a tidy sum is ominous. If the market for such items expands, we may well expect the rate of site destruction to jump above its current, almost incidental, levels.

Appendix A

Transliteration of Arabic Texts

Arabic texts have been transliterated according to the system used by the ArabTEX extension to LaTEX typesetting software (Lagally, 2004). However, I have substituted the letter *j* in place of ArabTEX's default use of *ǧ* to represent the Arabic letter ج because the former yields transliterations that are more easily readable by native English speakers. Some Arabic words (e.g., wādī) are in common enough usage in English that I have opted to anglicize their spelling, rather than retain a technical transliteration.

ا	a *or* ā	ذ	ḏ	ظ	ẓ	ن	n
ب	b	ر	r	ع	ʿ	ه	h
ت	t	ز	z	غ	ġ	و	w *or* ū
ث	ṯ	س	s	ف	f	ي	y *or* ī
ج	j	ش	š	ق	q	ء	ʾ
ح	ḥ	ص	ṣ	ك	k	ى	a
خ	ḫ	ض	ḍ	ل	l	ة	h *or* t
د	d	ط	ṭ	م	m		

Table A.1: Transliterations of Arabic characters used in this text.

Appendix B

Transliteration of Texts in Musnad Script

Musnad texts have been transliterated according to my own system, which is based heavily on the system employed by Christian Robin (Calvet and Robin, 1997, pp. 89–91). Reproduction of Musnad characters is accomplished with custom-built macros within LaTeX,[1] and the forms of the characters duplicate the glyphs used by Robin. Where the reading of a given character is unsure, I have enclosed my best guess within brackets, and where the characters are impossible to determine I have enclosed ellipses within brackets. In contrast to Robin's usage, however, brackets were chosen over parentheses because of the latter's similarity to the Musnad letter 𐩧. Other notations used by Robin, showing editorial corrections and breaks, have not been reproduced herein, nor has any attempt been made to vocalize the transliterations. Note, too, that numerical superscripts have only been used to denote 𐩯 (S^3), which has no exact correlate in either English or Arabic. The other variants of the letter *S* (𐩪 and 𐩦—S^1 and S^2, respectively) have been transliterated S and Š in order to increase readability.

𐩠	H	𐩨	B	𐩰	F	𐩸	Z
𐩡	L	𐩩	T	𐩱	ʾ	𐩹	Ḏ
𐩢	Ḥ	𐩪	S	𐩲	ʿ	𐩺	Y
𐩣	M	𐩫	K	𐩳	Ḍ	𐩻	Ṯ
𐩤	Q	𐩬	N	𐩴	J	𐩼	Ẓ
𐩥	W	𐩭	Ḫ	𐩵	D	|	*space*
𐩦	Š	𐩮	Ṣ	𐩶	Ġ		
𐩧	R	𐩯	S^3	𐩷	Ṭ		

Table B.1: Transliterations of Musnad characters used in this text.

[1] These LaTeX macros are currently in rough but serviceable form, but if interest is expressed, I may tidy up the source code and release the package publicly.

Appendix C

Cooking with GRASS

The GIS program GRASS was critically important in the development of good base maps for the MHAS survey data. The following pages describe, in abbreviated step-by-step fashion, the process by which these maps were produced from freely-available datasources.[1] It is hoped that these examples provide useful starting points for other researchers wishing to use GRASS for digital cartography.

C.1 Base Map Creation from Landsat TM Imagery

Though the combination of Bands 3 (Red), 2 (Green), and 1 (Blue) yields naturalistic colors, experimentation showed that the combination of Bands 3 (Red), 4 (Near-IR), and 5 (Mid-IR) produced an image that, for the purposes of the MHAS survey was more useful. This combination gave naturalistic colors across the wadi bottoms (the area covered by the survey), and various shades of blues, indigos, and purples atop the jōl—thus demarcating the survey area in a obvious and visually pleasing manner. Careful equalization of the bands fine-tuned the sensitivity with which wadi bottom details (such as sand, alluvium, orchards, fields, and urban areas) were rendered, thereby increasing the usefulness of the finished image (see Fig. C.1).

The following steps are carried out in a temporary GRASS location. After the Bands are combined, import the new image into the project's location with *r.proj*, and then georectify it against GPS data with *i.rectify*.

1. Import the Landsat TM bands with *r.in.gdal*.
2. Zoom into an area containing a variety of landforms that you would like to highlight. The more closely this area reflects the general ratio of landforms that you wish to highlight, the better those landforms will appear in the final image. You have little control over the rendering of landforms that are not present in this zoomed view. For our purposes, we zoomed into the Šibām area, closely enough that the wadi bottom occupied the majority of the scene (see Fig. C.2). Set the GRASS region to this zoomed view.

[1] These data sources are the Landsat TM and ETM+ scenes and the SRTM DTED described in Chapter 2 (2.2.4).

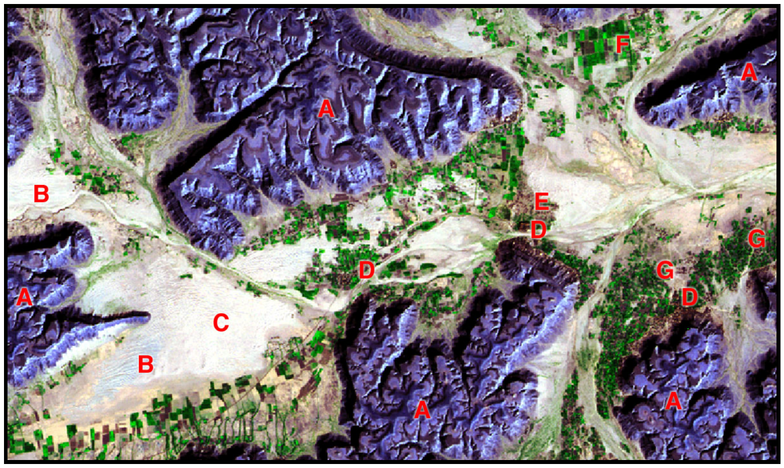

Figure C.1: Combined Bands 3, 4, and 5 of the MHAS Landsat TM image. Note the distinctive appearance of the following landforms: Jōl (A); Sand dunes (B); Loess (C); Urban areas (D); Modern fields, currently fallow (E); Cultivated fields (F); and Orchards (G). The clarity with which the landforms can be distinguished, as well as their naturalistic appearance, are the result of the process described below.

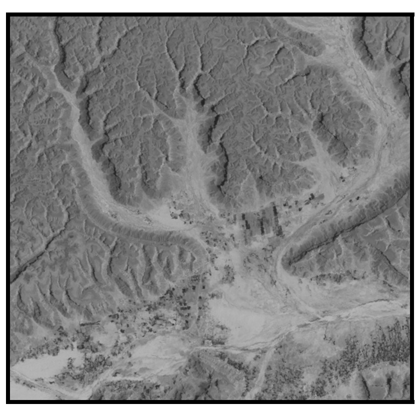

Figure C.2: The area around Šibām, as seen in Band 3 of the project's Landsat TM image. This is the region across which the Landsat Bands were equalized for the MHAS base map.

3. Equalize the color display of the imported Bands:
“r.colors col=grey.eq map=band3”
“r.colors col=grey.eq map=band4”
“r.colors col=grey.eq map=band5”

4. Reset the region to the maximum extent of the imported Bands:
“g.region rast=band3”

5. Combine the three equalized Bands:
“r.composite r=band3 g=band4 b=band5 output=landsat5”

C.2 Base Map Creation from Landsat ETM+ Imagery

Though most of the Bands of Landsat ETM+ images are of the same 30m resolution as Landsat TM images, Landsat ETM+’s 15m panchromatic Band 8 permits us to sharpen the image beyond what is possible with its predecessor. The following steps, carried out in a temporary GRASS location, approximate the results obtained with the Landsat TM imagery, but yield the higher resolution of the Landsat ETM+ panchromatic Band (see Fig. C.3).

1. Import the Landsat ETM+ bands with *r.in.gdal*.

2. Zoom into an area slightly larger than the region of your primary GRASS location. Set your GRASS region to this zoomed view.

3. Smooth the panchromatic band:
“r.bilinear input=band8 output=band8.sm”

4. Combine and enhance the multispectral data with a Brovey transform:
“i.fusion.brovey -l ms1=band5 ms2=band4 ms3=band3 pan=band8.sm outputprefix=brov”

5. Convert the Brovey enhanced Bands to integer data:
“r.rescale input=brov.red output=red to=0,255”
“r.rescale input=brov.green output=green to=0,255”
“r.rescale input=brov.blue output=blue to=0,255”

6. Zoom into a subregion of your image containing a representative sample of landforms, as described in Step 2 of the Landsat TM base map creation instructions (Section C.1, above).

7. Equalize the color display of the rescaled Bands:
“r.colors col=grey.eq map=red”
“r.colors col=grey.eq map=green”
“r.colors col=grey.eq map=blue”

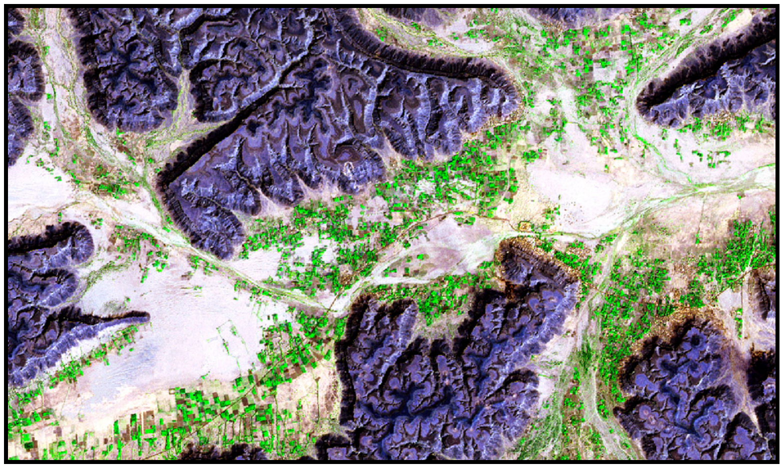

Figure C.3: View of the combined Bands of the MHAS Landsat ETM+ image. Compare against Fig. C.1, above. Note the higher contrast (to the point of washing out lighter details), the change in color of urban areas from chocolate brown to pale yellow, and the unnaturally bright greens. There is also a greater level of overall image noise, even after the steps taken to mitigate it. For these reasons, despite the higher resolution, the Landsat TM imagery generally serves better as a small-scale base map.

8. Reset the region to the area determined by Step 2 of this recipe:
   "g.region rast=red"

9. Combine the three equalized bands:
   "r.composite r=red g=green b=blue output=landsat7"

C.3 Contour Map Creation from SRTM Data

Though less accurate than good large-scale contour plans, and not finely detailed enough to be used for site-level plans, SRTM data can, nevertheless, be a good source of computer generated contour plans. The following instructions explain the process by which a regional contour plan was created for the MHAS (see Fig. C.4). As with the previous two examples, these steps are carried out in a temporary GRASS location, and are later imported into the project location with *v.proj*.

1. Import the SRTM files with *r.in.srtm*.

2. Tile the imported images to create a full scene:
   "r.patch input=srtm1,srtm2,srtm3,srtm4 output=srtm"

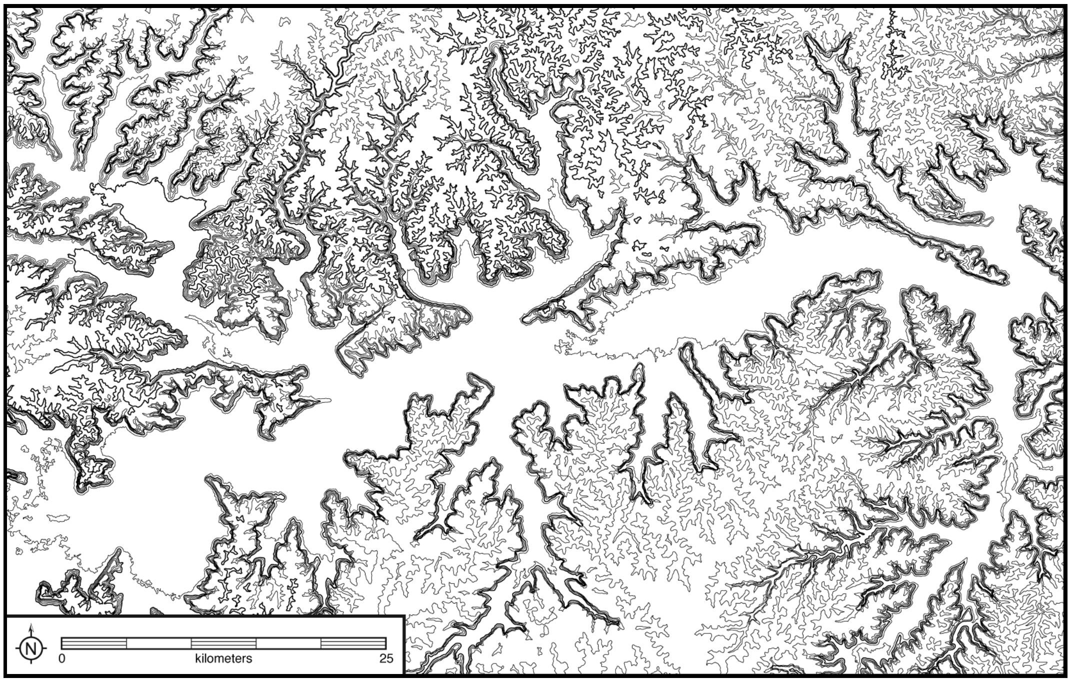

Figure C.4: 50m contour plan of the MHAS study area, created from SRTM data as described in Section C.3.

3. Fill voids in the patched image:
   "r.fillnulls input=srtm output=srtm.filled"

4. Create the contour plan with 50m contour intervals, discarding polygons of fewer than 25 points:
   "r.contour input=srtm.filled output=contours step=50 cut=25"

Note: if you intend to import the SRTM scene in the project location (with *r.proj*), do so with cubic smoothing. After importing, smooth the SRTM data further with a 5x5 average using *r.neighbors*. Both these steps reduce the jaggedess of the imported image, improving the naturalness of 3D scenes rendered with these data.

Bibliography

ADAMS, R. M.
1965 *Land Behind Baghdad: A History of Settlement on the Diyala Plains*. Chicago: University of Chicago Press.

ADAMS, R. M.
1981 *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates*. Chicago: University of Chicago Press.

ADAMS, R. M., NISSEN, H. J.
1972 *The Uruk Countryside: The Natural Setting of Urban Societies*. Chicago: University of Chicago Press.

ADOBE (PRESS RELEASE)
2007 Adobe to Release PDF for Industry Standardization.
http://www.adobe.com/aboutadobe/pressroom/pressreleases/200701/012907OpenPDFAIIM.html

AL-ANSARY, A. R.
1982 *Qaryat al-Fau: A Portrait of Pre-Islamic Civilisation in Saudi Arabia*. New York: St. Martin's Press.

ANONYMOUS
Integrated Geological Survey of the Western Part of the PDRY.

ANONYMOUS
1978 Unpublished maps of the Mission Française archaeological survey.

ARROYO-BISHOP, D., LANTADA ZARZOSA, M. T.
1995 To be or not to be: will an object-space-time GIS/AIS become a scientific reality or end up an archaeological entity?, pp. 43–53. London: Taylor & Francis.

AUDOUIN, R.
1997 Première prospection archéologique, extraits de journal. In *Hadramawt, la vallée inspirée*, C. J. Robin, ed., Saba, No. 3–4, pp. 35–39, Bruxelles: Amyris.

AVANZINI, A., BENVENUTI, C., BUFFA, V., LOMBARDI, A., ORAZI, R., SEDOV, A. V.
2002 *Excavations and Restoration of the Complex of Khor Rori: Interim Report (October 2001–April 2002)*. Tech. rep., Italian Mission to Oman (Università di Pisa), Pisa.

AVANZINI, A., SEDOV, A. V.
2005 *The stratigraphy of Sumhuram: new evidence*. Proceedings of the Seminar for Arabian Studies, 35:11–17.

AL-ʿAYDARŪS, Ḥ. ABU B.
2001 لمحات عن الرسوم للصخية في المنطقة الوسطى والشرقية والجول الشمالي لوادي حضرموت. Raydan, 7:85–104.

BADRE, L.
1991 *Le sondage stratigraphique de Shabwa 1976–1981*. Syria, 68(1–4):229–314.

BANNING, E. B.
2002 *Archaeological Survey*. New York: Kluwer Academic.

BEESTON, A. F. L.
1952 *The So-Called Harlots of Ḥaḍramawt*. Oriens, 5(1):16–22.

BEESTON, A. F. L.
1962 *Epigraphic and Archaeological Gleanings from South Arabia*. Oriens Antiquus, I, fasc. 1:41–52.

BEESTON, A. F. L.
1975 *The Himyarite Problem*. Proceedings of the Seminar for Arabian Studies, 5:1–7.

BEESTON, A. F. L.
1976 *Warfare in Ancient South Arabia (2nd–3rd centuries A.D.)*. Qahtan: Studies in Old South Arabian Epigraphy, London: Luzac.

BEESTON, A. F. L.
1981 *Old South Arabian Datings*. Proceedings of the Seminar for Arabian Studies, 11:1–5.

BENNETT, P.
2006 The NMEA FAQ.
http://vancouver-webpages.com/peter/nmeafaq.txt

BENT, T.
1900 *Southern Arabia*. London: Smith, Elder, & Co.

BEZZI, A., BEZZI, L., FRANCISCI, D., GIETL, R.
2004 Open Source Applications in Archaeology.

BISWELL, S., CROPPER, L., EVANS, J., GAFFNEY, V., LEACH, P.
1995 GIS and excavation: a cautionary tale from Shepton Mallet, Somerset, England. In *Archaeology and Geographical Information Systems: A European Perspective*, G. Lock, Z. Stančič, eds., pp. 269–285, London: Taylor & Francis.

BOSTOCK, J., RILEY, H. T., eds.
1857 *The Natural History of Pliny the Elder*. Henry G. Bohn.

BOWEN, R. L. B., ALBRIGHT, F. P.
1958 *Archaeological Discoveries in South Arabia*. Publications of the American Foundation for the Study of Man, Baltimore: Johns Hopkins Press.

BRAEMER, F., CLEUZIOU, S., STEIMER, T.
2003 *Dolmen-like structures: some unusual funerary monuments in Yemen*. Proceedings of the Seminar for Arabian Studies, 33:169–182.

BRETON, J.-F.
1979a *Le temple de Syn Ḏ-Ḫ̣LSM a Bā-Quṯfah (République démocratique populaire du Yémen)*. Raydan, 2:185–202.

BRETON, J.-F.
1979b *Prospections de la Mission archéologique française au Yémen du Sud dans le Wadi Hadramawt en 1979*. Syria, 61(3–4):427–431.

BRETON, J. F.
1980 *Religious Architecture in Ancient Ḥaḍramawt (PDRY)*. Proceedings of the Seminar for Arabian Studies, 10:5–17.

BRETON, J.-F.
1986 *Manhattan in the Hadramaut*. Saudi Aramco World, May/June.

BRETON, J.-F.
1987 Ancient Shabwa, The Capital of Ḥaḍramawt. In *Yemen: 3000 Years of Art and Civilisation in Arabia Felix*, W. Daum, ed., pp. 111–115, Innsbruck: Pinguin-Verlag.

BRETON, J.-F.
2003 *Preliminary notes on the development of Shabwa*. Proceedings of the Seminar for Arabian Studies, 33:199–213.

BRETON, J.-F., BADRE, L., AUDOUIN, R., SEIGNE, J.
1982 *Wādī Ḥaḍramawt, Prospections 1978–1979*. Aden: Centre culturel et de recherches archéologiques.

BRUNNER, U.
1997 *Geography and Human Settlements in Ancient South Arabia*. Arabian Archaeology and Epigraphy, 8:190–202.

CALVET, Y., ROBIN, C.
1997 *Arabie heureuse, Arabie déserte: les antiquités Arabiques du Musée du Louvre*. Notes et documents des musées de France, Paris: Réunion des musées nationaux.

CARSWELL, J.
1985 Blue-and-White in China, Asia and the Islamic World. In *Blue and White Chinese Porcelain and Its Impact on the Western World*, J. Carswell, ed., pp. 27–35, Chicago: University of Chicago.

CASANA, J.
2007 *Structural Transformations in Settlement Systems of the Northern Levant*. American Journal of Archaeology, 111(2):195–221.

CASSON, L.
1989 *The Periplus Maris Erythraei: Text with Introduction, Translation, and Commentary*. Princeton: Princeton University Press.

CATON-THOMPSON, G.
1944 *Tombs and Moon-Temple of Hureidha*. Oxford: Society of Antiquaries.

CATON-THOMPSON, G.
1953 *Some Palaeoliths from South Arabia*. Proceedings of the Prehistoric Society, N.S. 19:189–218.

CATON-THOMPSON, G., GARDNER, E. W.
1939 *Climate, Irrigation, and Early Man in the Hadhramaut*. Geographical Journal, 93:18–38.

CIUK, C., KEALL, E.
1996 *Zabid Project Pottery Manual 1995: Pre-Islamic and Islamic Ceramics from the Zabid area, North Yemen*, *BAR International Series*, vol. 655. Oxford: Tempus Reparatum.

CLARKE, D. L.
1977 Spatial Information in Archaeology. In *Spatial Archaeology*, D. L. Clarke, ed., pp. 1–32, London: Academic Press.

CLAXTON, J. B.
1995 Future Enhancements to GIS: Implications for Archaeological Theory. In *Archaeology and Geographical Information Systems: A European Perspective*, G. Lock, Z. Stančič, eds., pp. 335–347, London: Taylor & Francis.

COMFORT, A.
1997 *Satellite Remote Sensing and Archaeological Survey on the Euphrates*. Archaeological Computing Newsletter, (48):1–8.

COWGILL, G. L.
2004 *Origins and Development of Urbanism: Archaeological Perspectives*. Annual Review of Anthropology, 33:525–549.

CRASSARD, R.
2007 *Apport de la technologie lithique à la définition de la préhistoire du Hadramawt, dans le contexte du Yémen et de l'Arabie du Sud*. Ph.d. thesis, Université Paris 1.

DAMLUJI, S. S.
1992 *The Valley of Mud Brick Architecture: Shibām, Tarīm, & Wādī Ḥaḍramūt*. Reading, UK: Garnet Publishing.

DAUM, W.
1987 *Yemen: 3000 Years of Art and Civilisation in Arabia Felix*. Innsbruck: Pinguin-Verlag.

DE MAIGRET, A.
1981 *Two Prehistoric Cultures and a New Sabaean Site in the Eastern Highlands of North Yemen*. Raydan, 4:191–204.

DIAMOND, J. D.
2005 *Collapse: How Societies Choose to Fail or Succeed*. New York: Viking.

EBERT, J. I., CAMILLI, E. L., BERMAN, M. J.
1996 GIS in the Analysis of Distributional Archaeological Data. In *New Methods, Old Problems: Geographic Information Systems in Modern Archaeological Research*, H. D. G. Maschner, ed., Center for Archaeological Investigations, Southern Illinois University at Carbondale, Occasional Paper No. 23, pp. 25–37, Carbondale, IL: Center for Archaeological Investigations.

EDENS, C.
2002 Before Sheba. In *Queen of Sheba: Treasures from Ancient Yemen*, S. J. Simpson, ed., pp. 80–87, London: British Museum Press.

EDENS, C., WILKINSON, T. J., BARRATT, G.
2000 *Hammat al-Qa and the roots of urbanism in southwest Arabia*. Antiquity, 74:854–862.

EITELJORG, H.
2005 *CSA/ADAP Database Discussion*. Tech. rep., Center for the Study of Architecture.

EITELJORG, H., II, LIMP, W. F.
2007 *Archaeological Computing*. Electronic publication, Center for the Study of Architecture, Bryn Mawr.

EVERSON, M.
1998 Proposal to encode South Arabian in Plane 1 of ISO/IEC 10646-2.
`http://std.dkuug.dk/JTC1/SC2/WG2/docs/n1689/n1689.htm`

FEHÉRVÁRI, G.
2000 *Ceramics of the Islamic World in the Tareq Rajab Museum*. London: I. B. Tauris.

FISH, S. K., KOWALEWSKI, S. A.
1990 *The Archaeology of Regions: A Case for Full-Coverage Survey*. Washington, D.C.: Smithsonian Institution Press.

FITTS, W. R.
2005 *Precision GPS surveying at medieval Cottam, East Yorkshire, England*. Journal of Field Archaeology, 30(2):181–190.

FLEMING, S. J.
1999 *Roman Glass: Reflections on Cultural Change*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

FREITAG, U.
1999 *Hadhrami migration in the 19th and 20th centuries*. British-Yemeni Society Journal.

GAFFNEY, V., STANČIČ, Z., WATSON, H.
1995 The impact of GIS on archaeology: a personal perspective. In *Archaeology and Geographical Information Systems: A European Perspective*, G. Lock, Z. Stančič, eds., pp. 211–229, London: Taylor & Francis.

GLANZMAN, W. D.

2004 *Beyond their borders: a common potting tradition and ceramic horizon within South Arabia during the later first millennium BC through the early first millennium AD*. Proceedings of the Seminar for Arabian Studies, 34:121–138.

GRIAZNEVICH, P. A., SEDOV, A. V.

1995 Хадрамаут: Археологические, этнографические и историко-культурные исследования. Труды Советско-Йеменской комплексной экспедиции. Москва: Издательская Фирма.

HANSEN, D. P.

1994 *Excavations at Jujah-Shibam, Wadi Hadramawt—1994*. Field report to yemeni department of antiquities, General Organization of Antiquities, Monuments, and Manuscripts.

HANSEN, D. P.

1995 *Excavations at Jujah-Shibam, Wadi Hadramawt—1995*. Field report to yemeni department of antiquities, General Organization of Antiquities, Monuments, and Manuscripts.

HANSEN, D. P., OCHSENSCHLAGER, E. L., AL RADI, S.

2004 *Excavations at Jujah, Shibam, Wadi Hadhramawt*. Arabian Archaeology and Epigraphy, 15:43–67.

HARDING, G. L.

1964 *Archaeology in the Aden Protectorates*. London: Her Majesty's Stationery Office.

HARDY-GUILBERT, C.

2001 *Archaeological research at al-Shiḥr, the Islamic port of Ḥaḍramawt, Yemen (1996–1999)*. Proceedings of the Seminar for Arabian Studies, 31:69–79.

HARDY-GUILBERT, C., DUCATEZ, G.

2004 *Al-Šiḥr, porte du Ḥaḍramawt sur l'océan Indien*. Annales Islamologiques, 38:95–157.

HARDY-GUILBERT, C., ROUGEULLE, A.

1997 *Al-Shihr and the southern coast of the Yemen: preliminary notes on the French archaeological expedition, 1995*. Proceedings of the Seminar for Arabian Studies, 27:129–140.

HARLAN, D. K.

2000 *Computing in the field: Pylos Regional Archaeological Project, Messenia, Greece*. Archaeological Computing Newsletter, 55:1–6.

HARROWER, M., MCCORRISTON, J., OCHES, E. A.

2002 *Mapping the Roots of Agriculture in Southern Arabia: the Application of Satellite Remote Sensing, Global Positioning System and Geographic Information System Technologies*. Archaeological Prospection, 9:35–42.

HASSELL, J.

1997 *Alabaster Beehive-Shaped Vessels from the Arabian Peninsula: Interpretations from a Comparative Study of Characteristics, Contexts and Associated Finds*. Arabian Archaeology and Epigraphy, 8:245–281.

HASSELL, J.

2002 *Cuboid incense-burning altars from South Arabia in the collection of the American Foundation for the Study of Man: some unpublished aspects*. Arabian Archaeology and Epigraphy, 13:157–192.

HOUK, B. A., MOSES, B. K.

1998 *Scanning Artifacts: Using a Flatbed Scanner to Image Three-Dimensional Objects*. SAA Bulletin, 16(3):36–39.

HOURANI, A. H.

1970 Introduction: The Islamic City in Light of Recent Research. In *The Islamic City: Papers on Islamic History, 1*, A. H. Hourani, S. M. Stern, eds., pp. 9–25, Oxford: Bruno Cassirer.

HOURANI, G. F.

1995 *Arab Seafaring in the Indian Ocean in ancient and early Medieval times*. Princeton: Princeton University Press, third edition, revised and expanded by john carswell ed.

HUZAYYIN, S. A.

1937 *Egyptian University Scientific Expedition to South-West Arabia*. Nature, 140:513–514.

IBN ḤAMĪD, S. BIN M.

2003 مكتبة :صنعاء .تاريخ حضرموت، المسمى بالعدة المفيدة الجامعة لتواريخ قديمة وحديثة الإرشاد.

INGRAMS, W. H.

1936 *Hadhramaut: A Journey to the Sei'ar Country and Through the Wadi Maseila*. Geographical Journal, 88:524–551.

JAMME, A.

1962 *Sabaean Inscriptions from Maḥram Bilqîs (Mârib)*, *Publications of the American Foundation for the Study of Man*, vol. III. Baltimore: Johns Hopkins Press.

JOUKOWSKY, M. S., D'AGOSTINO, D. J.

1998 Artifact Studies and Databases. In *Petra Great Temple. Volume I: Brown University Excavations 1993–1997*, M. S. Joukowsky, ed., Providence, R.I.: E. A. Johnson.

KAMRANI, K.

2008 Data Portability in Paleoanthropology.
`http://anthropology.net/2008/01/10/data-portability-in-paleoanthropology/`

KEALL, E. J.
1983 *The Dynamics of Zabid and Its Hinterland: The Survey of a Town on the Tihama Plain of North Yemen*. World Archaeology, 14(3):378–392.

KENNET, D.
2007 *The decline of eastern Arabia in the Sasanian period*. Arabian Archaeology and Epigraphy, 18:86–122.

KHALIDI, L.
2006 *Settlement, Culture-Contact and Interaction Along the Red Sea Coastal Plain, Yemen: The Tihamah cultural landscape in the late prehistoric period, 3000-900 BC*. Ph.d. thesis, University of Cambridge.

KILBRIDE, W.
2005 *Past, present and future: XML, archaeology and digital preservation*. CSA Newsletter, XVII(3).

KING, G., TONGHINI, C.
1996 *A Survey of the Islamic Sites near Aden and in the Abyan District of Yemen*. London: University of London.

KING, J. C.
2007 ISO Ballot for PDF 1.7 Passed!
`http://blogs.adobe.com/insidepdf/2007/12/iso_ballot_for_pdf_17_passed.html`

LAGALLY, K.
2004 *ArabTEX : Typesetting Arabic and Hebrew, User Manual Version 4.00*.

LEVY, T. E., ANDERSON, J. D., WAGGONER, M., SMITH, N., MUNIZ, A., ADAMS, R. B.
2001 *Interface: Archaeology and Technology. Digital Archaeology 2001: GIS-Based Excavation Recording in Jordan*. The SAA Archaeological Record, 1(3):23–29.

LEWCOCK, R.
1986a *The old walled city of Ṣan‘a’*. Paris: UNESCO.

LEWCOCK, R.
1986b *Wādī Ḥaḍramawt and the Walled City of Shibām*. Paris: UNESCO.

LEWCOCK, R., HEYMAN, J.
1982 *Shibam and Wadi Hadramawt, Report No. 3*. Restricted Technical Report RP/1981-1983/4/7.6/04, UNESCO.

LEWIS, K. A.
2005 *Space and the Spice of Life: Food, Landscape, and Politics in Ancient Yemen*. Ph.d. thesis, University of Chicago.

MACINTOSH, D.
1986 *Chinese Blue & White Porcelain*. Hong Kong: Bamboo Publishing, 2nd ed.

AL-MADʿAJ, ʾA. AL-M. M. M.
1988 *The Yemen in Early Islam 9–233/630–847*. London: Ithaca Press.

MASCHNER, H. D. G.
1996 Geographic Information Systems in Archaeology. In *New Methods, Old Problems: Geographic Information Systems in Modern Archaeological Research*, H. D. G. Maschner, ed., Center for Archaeological Investigations, Southern Illinois University at Carbondale, Occasional Paper No. 23, pp. 1–21, Carbondale, IL: Center for Archaeological Investigations.

MASON, R. B., KEALL, E. J.
1988 *Provenance of Local Ceramic Industry and the Characterisation of Imports: Petrography of Pottery from Medieval Yemen*. Antiquity, 62:452–463.

MCCORRISTON, J.
2000 *Early Settlement in Hadramawt: Preliminary Report on Prehistoric Occupation at Shi'b Munaydar*. Arabian Archaeology and Epigraphy, pp. 129–153.

MCCORRISTON, J., HARROWER, M., OCHES, E., BIN ʻAQIL, A.
2005 *Foraging economies and population in the Middle Holocene highlands of southern Yemen*. Proceedings of the Seminar for Arabian Studies, 35:143–154.

MICROSOFT RESEARCH
2007 Nabonidus Archaeology Home Page.
http://www.nabonidus.org/

MINISTRY OF OIL AND MINERAL RESOURCES, OIL & MINERAL CORPORATION, MINERAL EXPLORATION BOARD
1990 Natural Resources Project (Map).

MONOD, T.
1978 *Sur un site à bracelets de verre des environs d'Aden (République démocratique populaire du Yémen)*. Raydan, 1:111–124.

MOUTON, M., BENOIST, A., SCHIETTECATTE, J., ARBACH, M., BERNARD, V.
2006 *Makaynūn, an ancient South Arabian site in the Ḥaḍramawt*. Proceedings of the Seminar for Arabian Studies, 36:229–242.

MUNRO-HAY, S. C. H.
1991 *The Coinage of Shabwa (Hadhramawt), and Other Ancient South Arabian Coinage in the National Museum, Aden*. Syria, 68(1–4):393–418.

MÜLLER, W. W.
1987 Outline of the History of Ancient Southern Arabia. In *Yemen: 3000 Years of Art and Civilisation in Arabia Felix*, W. Daum, ed., pp. 49–54, Innsbruck: Pinguin-Verlag.

NAVAL INTELLIGENCE DIVISION
1946 *Western Arabia and the Red Sea*. Geographical Handbook Series, B.R. 527, Great Britain: Naval Intelligence Division.

NELSON, M. C., HEGMON, M.
2001 *Abandonment Is Not as It Seems: An Approach to the Relationship between Site and Regional Abandonment*. American Antiquity, 66(2):213–235.

NEUBAUER, W.
2004 *GIS in Archaeology—the Interface between Prospection and Excavation*. Archaeological Prospection, 11:159–166.

ORCHARD, J.
1982 *Finding the Ancient Sites in Southern Yemen*. Journal of Near Eastern Studies, 41:1–21.

PARKER, A., DAVIES, C., WILKINSON, T.
2006 *The early to mid-Holocene moist period in Arabia: some recent evidence from lacustrine sequences in eastern and south-western Arabia*. Proceedings of the Seminar for Arabian Studies, 36:243–255.

PATTERSON, T.
2007 Natural Earth II (Map).
`http://www.shadedrelief.com/`

PEREGRINE, P. N.
1991 *A Graph-Theoretic Approach to the Evolution of Cahokia*. American Antiquity, 56(1):66–75.

PIOTROVSKI, M. B.
1994 L'economia dell'Arabia preislamica. In *I primi Arabi*, pp. 211–239, Milano.

PIOTROVSKIJ, M. B., SEDOV, A. V.
1994 *Field-Studies in Southern Arabia*. Raydan, 6:61–68.

PIRENNE, J.
1979 *L'apport des inscriptions a l'iterprétation du temple de Bā-Quṯfah*. Raydan, 2:203–241.

PLOG, F.
1977 Modeling Economic Exchange. In *Exchange Systems in Prehistory*, T. K. Earle, J. E. Ericson, eds., pp. 127–140, New York: Academic Press.

POLAROID (PRESS RELEASE)
2008 Notification of Polaroid Instant Film Availability.
`http://www.polaroid.com/ifilm/en/index.html`

POSEY, S.
1994 *Yemeni Pottery: The Littlewood Collection*. London: British Museum Press.

POTTS, D. T.
1988 Trans-Arabian Routes of the Pre-Islamic Period. In *L'Arabie et Ses Mers Bordieres*, J.-F. Salles, ed., Travaux de la Maison de l'Orient, pp. 127–162, Paris: Maison de l'Orient, 16 ed.

ROBIN, C.
1987 *Naqab al-Hajar. Les inscriptions*. Syria, 64:17–20.

ROBIN, C. J., VOGT, B.
1997 *Yémen: au pays de la reine de Saba'*. Paris: Flammarion.

RODIONOV, M.
2001 *Towards Typology of Visited Shrines in the Wâdî Ḥaḍramawt (with special reference to Mawlâ Maṭar)*. Raydan, 7:263–276.

ROUGEULLE, A.
1999 *Coastal settlements in southern Yemen: the 1996–1997 survey expeditions on the Ḥaḍramawt and Mahra coasts*. Proceedings of the Seminar for Arabian Studies, 29:123–136.

ROUGEULLE, A.
2001 *Notes on pre- and early Islamic harbours of Ḥaḍramawt (Yemen)*. Proceedings of the Seminar for Arabian Studies, 31:203–214.

ROUGEULLE, A.
2003 *Excavations at Sharmah, Ḥaḍramawt: the 2001 and 2002 seasons*. Proceedings of the Seminar for Arabian Studies, 33:287–307.

ROUGEULLE, A.
2004 *Le Yémen entre Orient et Afrique: Sharma, un entrepôt du commerce médiéval sur la côte sud de l'Arabie*. Annales Islamologiques, 38:201–253.

RYCKMANS, J.
1987 The Old South Arabian Religion. In *Yemen: 3000 Years of Art and Civilisation in Arabia Felix*, W. Daum, ed., pp. 107–110, Innsbruck: Pinguin-Verlag.

SALIBI, K. S.
1981 Ḥaḍramūt: A Name with a Story. In *Studia Arabica et Islamica: Festschrift for Iḥsān ʿAbbās on His Sixtieth Birthday*, al-Qāḍī, ed., pp. 393–397, Beirut: American University.

SAVAGE, S. H.
1990 GIS in archaeological research. In *Interpreting space: GIS and archaeology*, K. M. S. Allen, S. W. Green, E. B. W. Zubrow, eds., Applications of Geographic Information Systems, pp. 22–32, London: Taylor & Francis.

SCHIPPMANN, K.
2001 *Ancient South Arabia: From the Queen of Sheba to the Advent of Islam*. Princeton: Marcus Wiener Publishers.

SCHLOEN, D.
2006 ArchaeoML Schema Used in OCHRE.
`http://ochre.lib.uchicago.edu/index_files/ArchaeoML_Schema.htm`

SEDOV, A. V.
1992 *New archaeological and epigraphical material from Qana (South Arabia)*. Arabian archaeology and epigraphy, 3:110–137.

SEDOV, A. V.
1995a *Bi'r Ḥamad: a Pre-Islamic Settlement in the Western Wādī Ḥaḍramawt. Notes on an archaeological map of the Ḥaḍramawt, 1*. Arabian Archaeology and Epigraphy, 6:103–115.

SEDOV, A. V.
1995b Вади Аль-ʿАйн: Археологические Памятаики. In Хадрамаут: Археологические, этнографические и историко-культурные исследования. Труды Советско-Йеменской комплексной экспедиции, Грязневич, П. А., Седов, А. В., eds., pp. 162–175, Москва: Издательская Фирма.

SEDOV, A. V.
1995c Древняя Ирриг Ация Рейбуна. In Хадрамаут: Археологические, этнографические и историко-культурные исследования. Труды Советско-Йеменской комплексной экспедиции, Грязневич, П. А., Седов, А. В., eds., pp. 89–102, Москва: Издательская Фирма.

SEDOV, A. V.
1996a *Monuments of the Wādī al-'Ayn. Notes on an Archaeological Map of the Ḥaḍramawt, 3*. Arabian Archaeology and Epigraphy, 7:253–278.

SEDOV, A. V.
1996b On the Origin of the Agricultural Settlements in Ḥaḍramawt. In *Arabia Antiqua: Early Origins of South Arabian States*, C. Robin, I. Gajda, eds., pp. 67–86, Rome: Istituto Italiano per il Medio ed Estremo Oriente.

SEDOV, A. V.
1998 *Notes on the Pottery Sequence at Raybūn Settlement (Western Wādī Ḥaḍramawt)*. Tech. rep., Institute for Advanced Study, Princeton, NJ.

SEDOV, A. V.
2005 *Temples of Ancient Hadramawt*. Arabia Antica 3 - Studi di archeologia, Pisa: PLUS-Pisa University Press.

SEDOV, A. V., AL SAQQAF, A.
1996 *Al-Guraf in the Wâdî 'Idim: Notes on an archaeological map of the Ḥaḍramawt, 2*. Arabian Archaeology and Epigraphy, 7:52–62.

SEDOV, A. V., 'AYDARUS, 'U.
1995 *The coinage of ancient Hadramawt: The Pre-Islamic coins in the al-Mukallâ Museum*. Arabian Archaeology and Epigraphy, 6:15–60.

SEIGNE, J.
1982 Les Structures I, J et K de Mašġa. In *Le Wâdî Ḥaḍramawt, Prospections 1978–1979*, pp. 22–32, Aden: Centre culturel et de recherches archéologiques.

SEIGNE, J.
1991 *Le château royal de Shabwa. Architecture, techniques de construction et restitutions*. Syria, 68(1–4):111–164.

SELAND, E. H.
2005 *Ancient South Arabia: trade and strategies of state control as seen in the Periplus Maris Erythraei*. Proceedings of the Seminar for Arabian Studies, 35:271–278.

SERJEANT, R. B.
1950 *Materials for South Arabian History*. Bulletin of the School of Oriental and African Studies, 13(2):281–307.

SERJEANT, R. B.
1958 *A New Map of Southern Arabia, 2. The Problem of the Place Names*. Geographical Journal, 124(June):167–171.

SERJEANT, R. B.
1962 *Historians and Historiography of Ḥaḍramawt*. Bulletin of the School of Oriental and African Studies, 25(1/3):239–261.

SERJEANT, R. B.
1964 *Some Irrigation Systems in Ḥaḍramawt*. Bulletin of the School of Oriental and African Studies, 27:33–76.

SIMPSON, S. J.
2002 *Queen of Sheba: Treasures from Ancient Yemen*. London: The British Museum Press.

SMITH, G. R.
1987 The Political History of the Islamic Yemen down to the First Turkish Invasion. In *Yemen: 3000 Years of Art and Civilisation in Arabia Felix*, W. Daum, ed., pp. 129–139, Innsbruck: Pinguin-Verlag.

SMITH, S.
1954 *Events in Arabia in the 6th Century A.D.* Bulletin of the School of Oriental and African Studies, 16:425–468.

STEIMER-HERBET, T., DAVTIAN, G., BRAEMER, F.
2006 *Pastoralists' tombs and settlement patterns in Wādī Washʿah during the Bronze Age (Ḥaḍramawt, Yemen)*. Proceedings of the Seminar for Arabian Studies, 36:257–265.

SUMNER, W. M.
1990 Full-Coverage Regional Archaeological Survey in the Near East: An Example from Iran. In *The Archaeology of Regions: A Case for Full-Coverage Survey*, S. K. Fish, S. A. Kowalewski, eds., pp. 87–115, Washington, D.C.: Smithsonian Institution Press.

TAINTER, J. A.
1988 *The Collapse of Complex Societies*. New Studies in Archaeology, Cambridge: Cambridge University Press.

TINDEL, R. D.
1994 The Rise of the Ḥimyar and the Origins of Modern Yemen. In *Arabia Felix: Beiträge zur Sprache und Kultur des vorislamischen Arabien. Festschrift Walter W. Müller*, R. Richter, I. Kottsieper, M. Maraqten, eds., pp. 273–278, Wiesbaden: Harrassowitz Verlag.

TRIPCEVICH, N.
2004 *Mobile GIS in Archaeological Survey*. The SAA Archaeological Record, 4(3):17–22.

TUFNELL, O.
1961 *"These Were the Potters..." Notes on the Craft in Southern Arabia*. Annual of Leeds University Oriental Society, 2:26–36.

ULLMAN, L., GOROKHOVICH, Y.
2006 *Google Earth^{TM} and Some Practical Applications for the Field of Archaeology*. CSA Newsletter, XVIII(3).

UNESCO
2002 UNESCO World Heritage Center Virtual Congress.
http://www.virtualworldheritage.org/index.cfm?pg=PapersProjects&l=en

UR, J. A., KARSGAARD, P., OATES, J.
2007 *Early Urban Development in the Near East*. Science, 317:1188.

VAN BEEK, G. W.
1969 *Hajar Bin Ḥumeid: Investigations at a Pre-Islamic Site in South Arabia*, *Publications of the American Foundation for the Study of Man*, vol. V. Baltimore: Johns Hopkins Press.

VAN BEEK, G. W., COLE, G. H., JAMME, A.
1963 An Archaeological Reconnaissance in Hadhramaut, South Arabia—A Preliminary Report. In *Annual Report of the Smithsonian Institution (Publication 4530 for 1963)*, pp. 521–545, Washington, D.C.: US Government Printing Office.

VAN DER MEULEN, D., VON WISSMANN, H.
1932 *Ḥaḍramaut: Some of Its Mysteries Unveiled*. Leiden: E. J. Brill.

VERBA, M. P., AL-KASIRI, A. S., GONCHAROVA, N. A., CHIZHIKOVA, N. P.
1995 *Impact of Irrigation on Micromorphological Features of Desert Soils of Hadramout Valley (Yemen)*. Eurasian Soil Science, 27(9):108–124.

VOGT, B., SEDOV, A.
1994? *Surveys and Rescue Excavations in the Hadhramawt Gouvernorate [sic], Republic of Yemen*. Tech. rep., Canadian Occidental.

VOGT, B., SEDOV, A.
1998 *The Sabir culture and coastal Yemen during the second millennium BC—the present state of discussion*. Proceedings of the Seminar for Arabian Studies, 28:261–270.

VON WISSMANN, H.
1932 Ḥaḍramaut (Map).

VON WISSMANN, H.
1958a *A New Map of Southern Arabia, 1. Basis and Compilation of the Map*. Geographical Journal, 124(June):163–167.

VON WISSMANN, H.
1958b Southern Arabia (Map).

VON WISSMANN, H., HÖFNER, M.
1952 Beiträge zur historichen Geographie des vorislamischen Südarabien. In *Akademie der Wissenschaften und der Literatur*, Mainz.

WATSON, O.
2004 *Ceramics from Islamic Lands*. London: Thames & Hudson.

WESTCOTT, K.
2002 *Archiving electronic documents*. Archaeological Computing Newsletter, (58):1–6.

WHEATLEY, D.
1998 *Ranters Corner: Keeping the camp fires burning: the case for pluralism*. Archaeological Computing Newsletter, 50:2–7.

WHITCOMB, D.
1996 *Urbanism in Arabia*. Arabian Archaeology and Epigraphy, 7:38–51.

WHITCOMB, D. S.
1988 Islamic Archaeology in Aden and the Hadhramaut. In *Araby the Blest: Studies in Arabian Archaeology*, D. T. Potts, ed., Carsten Niebuhr Institute Publications, pp. 177–263, Copenhagen: University of Copenhagen.

WHITE HOUSE OFFICE OF THE PRESS SECRETARY
2000 Statement by the President Regarding the United States' Decision to Stop Degrading Global Positioning System Accuracy.
`http://www.ngs.noaa.gov/FGCS/info/sans_SA/docs/statement.html`

WILKINSON, T. J.
2000 *Regional Approaches to Mesopotamian Archaeology: The Contribution of Archaeological Surveys*. Journal of Archaeological Research, 8(3):219–267.

WILKINSON, T. J.
2005 *The Other Side of Sheba: Early Towns in the Highlands of Yemen*. Bibliotheca Orientalis, 62(1/2):5–14.

WILKINSON, T. J., EDENS, C.
1999 *Surveys and Excavation in the Central Highlands of Yemen: Results of the Dhamār Survey Project, 1996 and 1998*. Arabian Archaeology and Epigraphy, 10:1–33.

YEAZEL, J.
2000 New Data from U.S. National Geodetic Survey: Comparison of Positions With and Without Selective Availability.
`http://gpsinformation.net/uscg.html`

ZIMMERMAN, P. C.
1997 *Middle Hadramawt Archaeological Survey, 1997*. Field report, General Organization for Antiquities, Manuscripts, and Museums.

ZIMMERMAN, P. C.
1999 *Middle Hadramawt Archaeological Survey, 1999*. Field report, General Organization for Antiquities, Manuscripts, and Museums.

ZIMMERMAN, P. C.
2000 *Middle Hadramawt Archaeological Survey: Preliminary Results, October 1999 Season*. Yemen Update, 42:27–29.

ZIMMERMAN, P. C.
2001 *Middle Hadramawt Archaeological Survey, 2001*. Field report, General Organization for Antiquities, Manuscripts, and Museums.

ZIMMERMAN, P. C.
2004 *Middle Ḥaḍramawt Archaeological Survey, 2004*. Field report, General Organization for Antiquities and Museums.

ZIMMERMAN, P. C., FITTS, W. R., POULS, M. A.
1999 SiteMap: Innovations in Computer Based Mapping for Archaeologists. In *Computer Applications in Archaeology*, Computer Applications in Archaeology.

ZUBROW, E. B. W.
1990 Contemplating space: a commentary on theory. In *Interpreting space: GIS and archaeology*, K. M. S. Allen, S. W. Green, E. B. W. Zubrow, eds., Applications of Geographic Information Systems, pp. 67–72, London: Taylor & Francis.

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