ORIENTAL INSTITUTE INVESTIGATIONS IN YEMEN 1994

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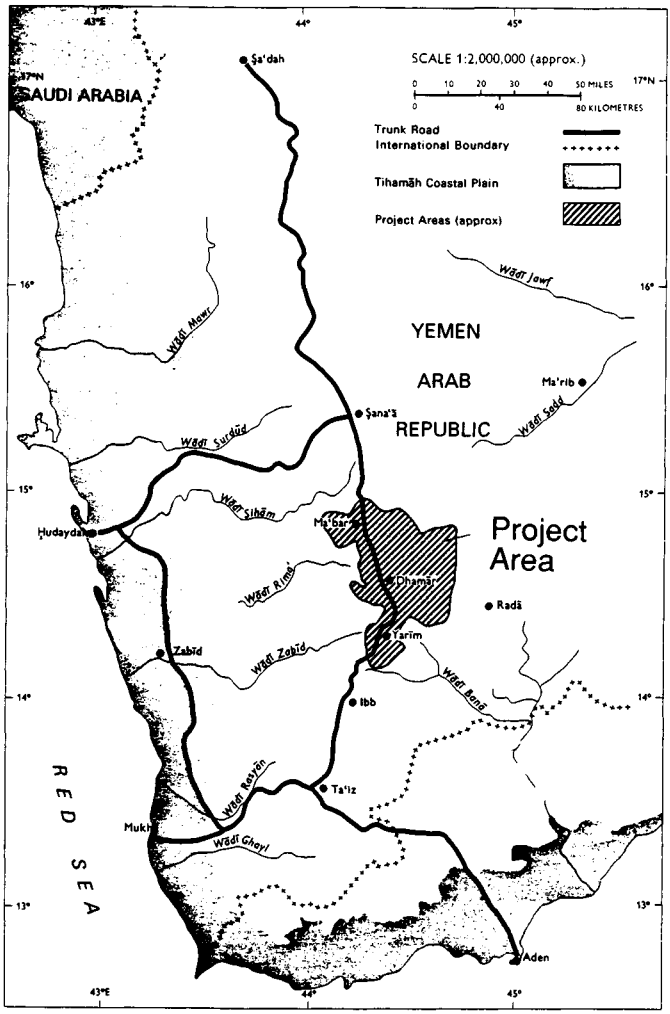
Introduction

With the aid of a grant from the National Science Foundation, a small team from the Oriental Institute, consisting of McGuire Gibson, T. J. Wilkinson, and Allen McCune, set out in March 1994 to study the archaeology of highland Yemen (map 1). Emphasis was placed on the study of the archaeological landscape and most specifically the development of the spectacular systems of ancient terraced fields that clothe the mountain slopes in this verdant part of southwestern Arabia (fig. 1). The objective of the new fieldwork was to build upon a pioneering environmental-archaeological survey initiated by McGuire Gibson in 1978 on the Dhamar Plain, a large agricultural area in the mountains about sixty miles south of Sanaa. The fieldwork at that time was carried out by field director Raymond Tindel and geomorphologist Stephen Lintner, who concentrated on the Himyarite capital of Zafar and its immediate vicinity in the southeastern part of the plain. As a result of this research, Tindel wrote a doctoral dissertation that offered a greatly improved chronological and artifactual base for the study of the Himyarite kingdom, which flourished from the second century B.C. until A.D. 525.

The 1994 team was able to take advantage not only of Tindel's work but also of published archaeological surveys and excavations carried out in the 1980s by an Italian expedition in an area to the northeast of the Dhamar Plain. For preliminary study in Chicago we also had a set of aerial photographs and maps that had been purchased for the 1978 survey, as well as numerous technical reports on soils, hydrology, population dynamics, and other topics that had been done for agricultural development projects in the Dhamar Plain. Thus, when we arrived in Sanaa, we had already pinpointed several areas of the plain for special attention. We found easy access to extraordinarily good libraries in the Ministry of Agriculture and other resource collections in Sanaa. In the project area, we found other advantages that were not in existence in 1978. Now there were new or greatly improved roads that allowed much easier access to most parts of the survey area and we were able to cover a

Figure 1. Terraced fields in mountains to the west of Dhamar, Yemen



Map 1. Location of research area in Yemen

great area in a short time. Thus, we could gain a much broader perspective on the development of archaeology and agriculture in highland Yemen than would have been possible fifteen years earlier. While in Sanaa we benefited considerably from the facilities of the American Institute for Yemeni Studies and its Resident Director David Warburton and from the efficient services of the General Organization for Antiquities, Monuments, and Manuscripts. We wish to acknowledge the encouragement and help of the General Organization, especially Dr. Muhammad Bafiqeh, Dr. Yusuf Abdullah, and Dr. Ahmed Bataya, who showed very obvious enthusiasm for a study of the Himyarite heartland.

Historically, the Himyarite kingdom appeared fairly suddenly, probably during the first or second centuries B.C. It has been suggested that this rise was approximately synchronous with the decline of the Sabaen kingdom along the desert fringes of northeastern Yemen and Hadhramaut, but to what extent the moist Yemen highlands were actually inhabited prior to the Himyarite state has remained a mystery. Although it is tempting to see the development of terraced agriculture

as being related to the rise of Himyar, without detailed archaeological evidence, such a scenario remains a theory based upon the largely negative evidence of the lack of South Arabian texts from the highlands before the first and second centuries B.C. Our objectives were therefore to make a general reconnaissance of the core area of ancient Himyar, the broad agricultural plain and the mountain valleys that surround Dhamar. In particular, we intended to examine the terraces with a view to dating them, and most important, to provide an archaeological and environmental framework within which to place the fields. The grant from the National Science Foundation (No. 10126-01-01) was under a program that explicitly provides funds for exploratory and "high risk" projects. Our timing was therefore impeccable, being at the onset of civil war. Our chosen field base, a house within the Seed Potato project in Dhamar, was equally appropriate for a high risk project, with its location between rival camps of southern and northern Yemeni battalions. Salvoes fired over us on two nights toward the end of our stay reminded us of the fragile political state of the country and made us aware of the necessity to be ready to evacuate at a moment's notice. On the second occasion, the firing was mostly the celebration of a wedding, but the camps did join in for a few minutes. The amazing thing was that in the mornings after the events, the town was normal and the camps appeared to be operating as usual, with soldiers coming out to buy groceries, talking to the townspeople, and drinking tea. According to foreign radio reports that we listened to after the events, the town was supposed to be badly damaged and there were supposed to be tanks in the streets. There were, in fact, no casualties and no damage. We managed to complete our season before the full-scale outbreak of war, which occurred two weeks after our departure. It happened that one of the first events in the actual war was a battle at Dhamar, in which tanks of the southern battalion that had shot over us dashed around to the northwest and got close enough to the town of Mabar to damage a key electrical substation. The result was that not only was the Dhamar area blacked out, but Sanaa also was without electricity for several days.

Environmental Background

As part of the mountain area of Yemen, the Dhamar area receives the benefit of two monsoon seasons per year (March–April, July–September), accounting for the fact that much of this corner of the Arabian Peninsula is green and can even have lush vegetation. The rainfall through the millennia has resulted in deeply-cut valleys that can carry tremendous flash floods that must be controlled or at least partially diverted if the water and soil are not to be carried west to the Red Sea or dissipated upon the desert of the Empty Quarter to the east. The deeply dissected mountains, rising to a little over 3,000 meters, receive up to 700 millimeters of rainfall in the western part of the study area, falling to less than 200 millimeters in the valleys of the desert fringe in the northeast. In much of the area, unless the rains can be diverted and the moisture retained in the soil of the fields, agriculture is not possible. Clearly, there have been techniques for diverting and using the water for thousands of years in Yemen. These techniques have made it possible to sustain a remarkably high population density. In modern Yemen, density is frequently between 100 and 180 persons per square kilometer, which is one of the densest rural populations in the Middle East. It is to be expected that pressure on the land also would have been high in antiquity. Because the narrow valleys and steep slopes provide limited fertile soil, it can be expected that as the population

increased through time, terraces would be extended up the sides of mountains and encroach upon pre-existing sites. These sites would constantly be threatened with destruction or would be destined to be recycled into later occupations, as the present-day villages with their reuse of ancient blocks clearly show. But it is also expected that, in antiquity, newer terraces would encroach on and rework older terraces, just as terraces are being reworked today.

Techniques and Field Problems

Although forming a conspicuous element in the landscape of Yemen, the systems of terraced fields are remarkably little known. There is little published information on how terraces are constructed, how long it takes, how much labor is involved, and how long they last. We had estimates of a month to a year for the construction of a terrace but have concluded that normally a few men could construct a terraced field of half a hectare in about a month with traditional tools. Terraces are notoriously difficult to date and we felt that simply digging trenches through them would not necessarily provide the required dating evidence. Consequently our approach was to examine the entire archaeological landscape and also to conduct sample archaeological and environmental surveys, in order to provide an overall framework within which the terraces could be placed. Therefore, we examined terraced fields, ancient dams, ancient water conduits, archaeological sites, threshing floors, ancient roads, and sequences of natural sediments. Our approach, which entailed undertaking archaeological surveys of selected sample areas, was considerably aided by analysis of our aerial photographs and maps. The aerial photographs enabled us to make interpretative three-dimensional maps, which when combined with other data supplied by the published technical reports mentioned above, have provided a valuable database for archaeological research. Because the mountain areas of Yemen are extremely rugged, so that even four-wheeled vehicles cannot reach certain places, the aerial photographs gave us a means of estimating the probability of finding ancient remains, thus reducing somewhat the amount of territory that would have to be walked or climbed. While carrying out the field mapping program we asked about sites and discussed local settlement history with local people. We found the people to have a keen interest in the ancient past but a decided preference for Himyarite remains. Often, earlier sites that we came upon were not recognized by the local people as "ruins" or were not mentioned. We recorded photographically all inscriptions that we found, usually in secondary contexts such as the walls of present-day village houses (fig. 2). Ali Sanabani, the Dhamar area Antiquities Organization official, was an important member of the team partly because of his ability to read the inscriptions. But he was also an invaluable expert on the area because he had visited many sites as part of his university training and, more importantly, he had grown up here and could show us sites and faint rock inscriptions that he had found as a boy. It was also im-

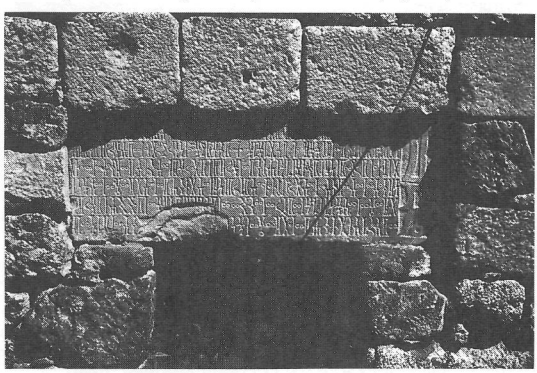


Figure 2. Ancient stones in modern walls

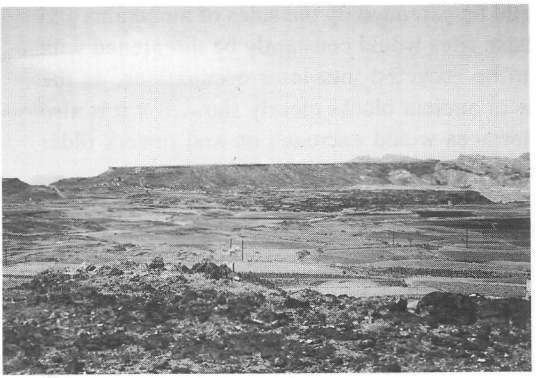


Figure 3. Photograph of Khirbet Maryah

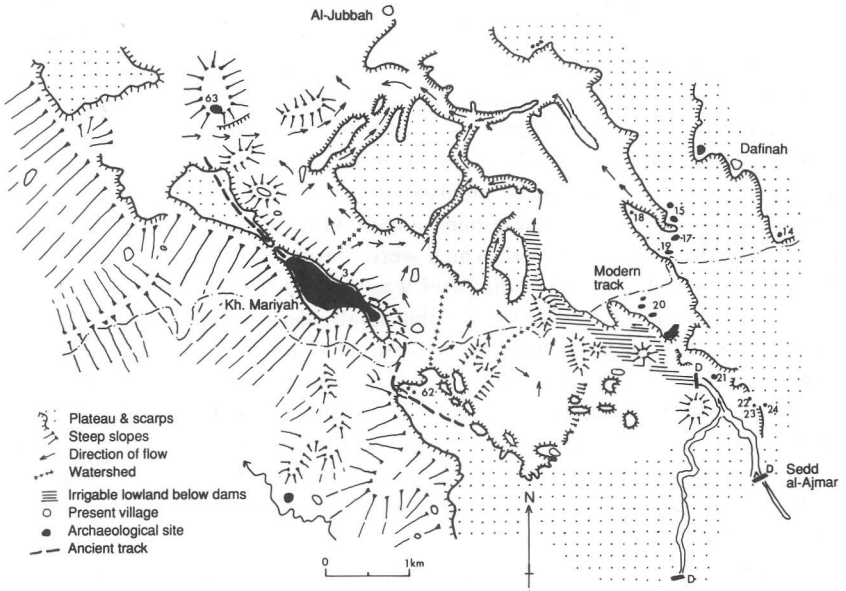
portant that he was a member of an important tribe in the area and could gain us a friendly welcome in places where official papers might have been disregarded.

Preliminary Field Results

Although construction of terraced fields can result in the destruction of archaeological sites, the soils that accumulate behind the walls protect the underlying soils. As a result we were able to record numerous exposures of a dark organic soil that had apparently pre-dated the construction of terraced fields. This soil indicates that, before the creation of terraced agriculture, the mountain slopes were stabilized, probably with forest, the destruction of which ushered in a phase of soil erosion. The organic soil corresponds to a period of marsh development on the Dhamar plain dated to between 7,200 and 4,600 radiocarbon years ago (i.e., pre-Bronze Age). This is contemporaneous with the so-called Neolithic pluvial of southern Arabia, a period when the present monsoonal air circulation was strengthened and rainfall was increased over the southern half of the peninsula. Our observation of the extensive development of this moist and forested interval extends the record of this event into the moist Yemen highlands for the first time. The finding of obsidian flakes in one exposure of this organic soil makes if probable that, eventually, we will discover sites related to this moist phase in the Dhamar Plain.

Archaeological survey of selected sample areas demonstrated that settlement extended well back into pre-Himyarite times. Although the ancient pottery of the highland region remains little known, we managed to build up a skeleton chronology that we can bolster with a few radiocarbon dates expected to result from samples taken in key locations. But the ceramic chronology can be placed upon a firm foundation only by future excavation. We have tentatively dated a major site called Mihrab (Site 45) to the Bronze Age (third/early second millennium B.C.) and have evidence of a few minor settlements of the same time. Mihrab, in the northeastern part of the area, links up with similar sites recorded beyond our area by an Italian team during the early 1980s. Predictably, the Himyarite period, with its red-gloss pottery reminiscent of Roman wares, provided the largest number of sites (sixteen) but thirteen sites that we would date to late pre-Himyarite or Iron Age date (first millennium B.C.) suggest that occupation was significant even before the rise of the Himyarite state. Among the large number of Himyarite sites was Khirbet Maryah, some

Figure 4. Major Himyarite dam of Sedd al-Ajmar, near Khirbet Maryah



Map 2. Site of Himyarite city, Khirbet Maryah, and its sustaining area

twenty kilometers west of Dhamar (map 2, fig. 3). This fifteen to twenty hectare plateau-top town overlooked, on its eastern side, a broad plain that was partly irrigated by means of a major dam of the same date. Interestingly this dam, Sedd al-Ajmar (fig. 4), like a second massive monumental dam at Adhra'a to the east of Dhamar, had been breached by a major flood in antiquity. Both dams were constructed within relatively modest-sized, narrow valleys, but despite their size these valleys generated sufficient flow to produce occasional massive floods. In contrast, on the larger, more open valley below Zafar, which clearly once conducted large flood flows, Himyarite dams were of modest height but remained unbreached (fig. 5). The need for only low dams, which were not breached, suggests that already by the Himyarite period the landscape was sufficiently affected by terracing, which would act to trap water on the slopes, that flood events were of modest scale and controllable. In other words, in some areas, terraced fields must already have existed and were intercepting rainwater and runoff before the low dams were built. The existence of terraces prior to the Himyarite period is supported by observations from other parts of the study area where very eroded and weathered terraces can be observed adjacent to Bronze Age and Iron Age sites, which could not have been supported except by these relic terraces.

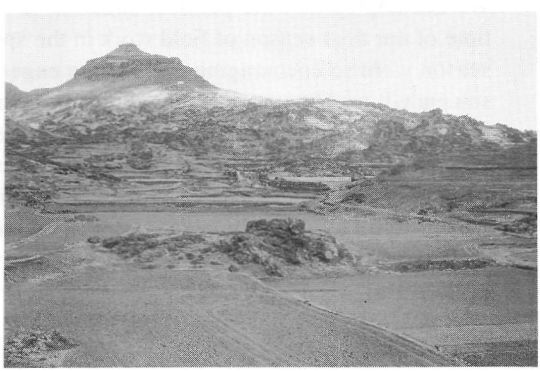


Figure 5. Low dam of Sedd Majid al-Suflah, to the east of Zafar

Although much more survey and excavation are necessary to support the above observations, the discovery of sixty-three sites in less than one month of field work in selected locations indicates that the area must have been densely settled back until at least the third millennium B.C. The dams, which probably numbered well over a hundred in the study area, appear mainly to have been constructed during the Himyarite period. Although they were designed to hold water only for short periods and are really to be classed as diversion devices, the dams did serve to raise the level of flow enough to supply fields at some distance downstream, thus expanding the agricultural base around important towns. The dams required high investments of labor and capital, which were presumably available and could be mobilized during the period when Zafar was the capital. However, as in modern Yemen, most people will have lived within small, dispersed villages, and again as today, terraced fields could have been constructed and managed by small household-size units, without recourse to dams. Presumably after the collapse of the Himyarite kingdom in the mid-sixth century A.D., the coordinated program of dams and the downstream system of fields that depended on them went out of use, to be replaced once again by simpler forms of terraced agriculture. This was, however, probably a gradual process, for a few of those dams remained in use as short-term reservoirs until recent times. In one location, a reservoir is even today deep enough to hold sufficient water for swimming during a short period each year; during the rest of the year, the reservoir is a pasture and a soccer field. In many cases, ancient dams are still being used, not as dams but as the retaining walls of large-scale terraces. The ancient sluices that funneled water from the reservoir through the dams in a controlled way and were often cut out of living rock at either end of the dams, have long ago been sealed, because now the purpose of the dams is to hold water only long enough to let it sink into the fields behind the dams rather than direct it into conduits for transport to fields downstream.

Even though dams have become only retaining walls for terraces, the continuity involved in the complex system of water control is emphasized by the fact that people in the Zafar area today know that these constructions were Himyarite and refer to them by names recorded in the tenth century by the Arab writer, Hamdani, who traveled through the region and said that the Himyarites had built eighty dams in the vicinity.

Conclusion

We are hoping that the political situation in Yemen will return to normal by the time of our next season of field work in the spring of 1995. The results of the past season were so encouraging that we are eager to resume the work. Since the season ended, we have been re-examining the aerial photographs with a greater confidence that we can spot ancient sites for future examination. The next season will entail not just a continuation of survey for sites, but the conducting of small excavations on specific ones that are thought will yield sequences of pottery. This work will establish a firmer chronology as well as add to the general database of Yemeni archaeology, which is still in its relative infancy.