

Ṭīwī, Ash Shāb and Wādī Ṭīwī: the Development of an Oasis on the North-eastern Coast of Oman

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INTRODUCTION

Ṭīwī on the north-eastern coast of Oman holds a unique position in a region which cannot *a priori* be called geographically advantageous: the Jabal Banī Jābir part of the Eastern Ḥajar Mountains stretches parallel to the coast between Dagħmar and Ṣūr, leaving only a narrow coastal plain. From Ash Shāb to Qalhāt, the mountain slopes reach immediately down to the shore. Several terraces in the slopes have been shaped by the surf of the sea at different stages in the geological history of the mountains (Scholz 1980, 1: 36) (pls. 1, 2).

The rather drab picture of this stretch of the Omani coast is considerably modified by two canyons which cut deep into the mountains. The more important of the two is Wādī Ṭīwī (pls. 3-7), the bottom of which is planted with date palms on a length of c. 9 km. A perennial flow of surface water is the main feature of Wādī Ṭīwī. The wādī is populated by several villages, which can be reached on a dirt road. At the end of this road is the village of Mīḥām, c. 8 km from the coast as the crow flies. The lush scenery of Wādī ash Shāb and Wādī Ṭīwī forms a striking contrast to the barren slopes on the coast. The natural conditions of the two valleys certainly should have favoured settlement and land use at an early stage.

The smaller canyon is Wādī ash Shāb, which reaches the coast c. 2.3 km north-west of the mouth of Wādī Ṭīwī. The canyon of Wādī ash Shāb is much narrower so that the date palm plan-

tation is squeezed in between the cliffs of the canyon, forming a narrow green strip which reaches no further than 3 km into the wādī. The estuaries of the two wadis have formed a clinging point for two settlements, one of which - Ash Shāb - has the character of a village, while the other - Ṭīwī - can justly be called a town, the market of which performs a central function in the region. In the last few years, the two have grown together in legal terms (they form a unified community under the name of Ṭīwī) as well as from the urbanist point of view.

As in other parts of Oman, the rapid overall economic upsurge of the last few decades has led



PLATE 1. The coast of Oman at Ṭīwī and Ash Shāb



PLATE 2. View along the coast to the south-east, from the mountain south of the entrance to Wādī Tīwī.



PLATE 3. Wādī Tīwī: view from the terrace above the town.

to considerable changes in the local economy and in the material culture of *Ṭīwī*. At the same time, comparatively little is known about the history and the prehistory of the area and its traditional economic foundations. Detailed information is scarce in the few travel reports which mention the town. As for other places in Oman, Lorimer's report (1970, 2: 1906) is a notable exception in his estimate of population and economic resources, if not free from errors.

Archaeological reconnaissance of the coast between Muscat and *Rā's al Ḥadd* started in 1983 when an Italian team conducted a first survey in the area (Tosi 1983: 332). The most interesting site discovered during this investigation was GAS1, a settlement complex with a long range of prehistoric occupation, spreading over half a hectare on a headland at the mouth of *Wādī ash Shāb*. Settlement traces were situated in a shell midden, which is the largest of the whole coast. It yielded hundreds of flint tools, including many *Rā's al Ḥamri*an chisels and various types of straight and curved awls as well as many greenstone tubular beads and earrings (Biagi 1988: 273). Two radiocarbon dates were obtained from this site: 4540 ± 60 B.P. and 5850 ± 160 B.P. (Ibrahim and ElMahi 2000: 127). This is the earliest known occupation in the region. An excavation project started in the Spring of 2002, again conducted by an Italian team under the leadership of Maurizio Tosi, with

Donatella Usai as field director (Tosi and Usai 2003).

Another survey was undertaken by the Department of Archaeology of Sultan Qaboos University in 1997 (Ibrahim and ElMahi 2000: 119). It was carried out between *Quriyyāt* and *Ṣūr* along the line of the planned coastal road. In addition to some other flint sites of the 4th millennium B.C., a settlement and a large cemetery were recorded at *Ṭīwī/Jurayf*. The settlement was dated to the 12th to 15th century A.D. (Ibrahim and ElMahi 2000: 127).

All former studies have concentrated on the coastal area, whereas the hinterland - e. g. *Wādī Ṭīwī* - has never been surveyed by an archaeological team before the investigations described below.

To fill a gap in the knowledge on the region, a survey of the agricultural economy, the archaeology and the urban structures of *Ṭīwī* and its surroundings has been conducted in several campaigns from spring 2002 onwards. This research has been carried through within the scope of the interdisciplinary project 'Transformation in Oasis Settlements of Oman', a joint undertaking of teams from the universities of Kassel, Stuttgart, Tübingen, and from the German Archaeological Institute (DAI) at Berlin, in collaboration with Sultan Qaboos University. The project is funded by the German Research Association (Deutsche Forschungsgemeinschaft). The present article tries

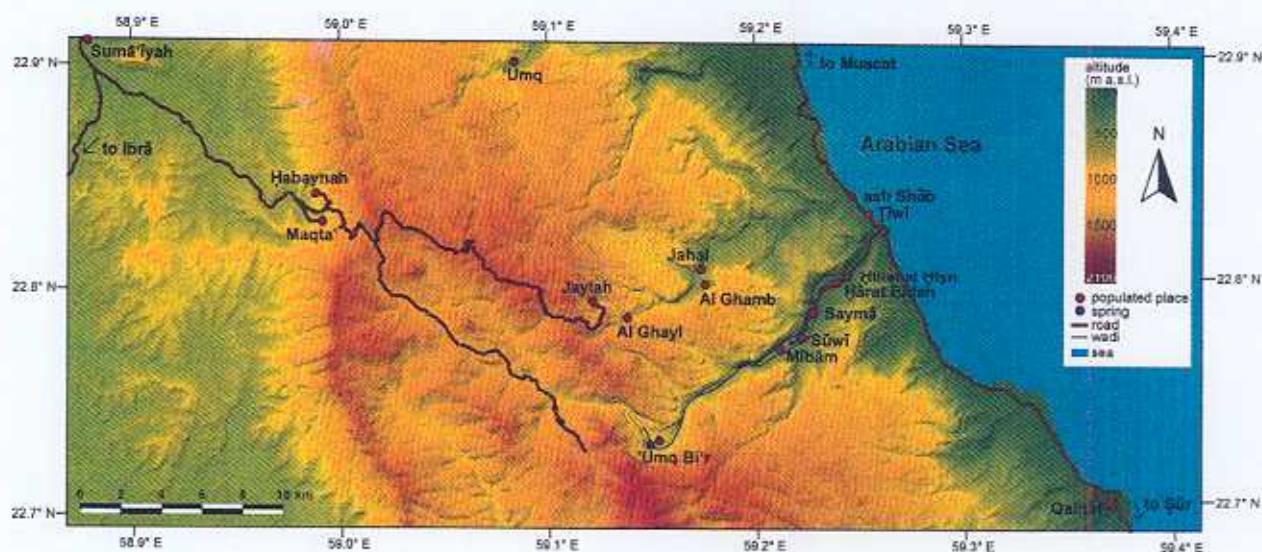


FIGURE 1. *Wādī Ṭīwī* area, three-dimensional digital elevation model with the major natural and infrastructural features.

to describe extant structures at Ṭīwī and in Wādī Ṭīwī in terms of agricultural land use, archaeological evidence, and the present use of built substance. It attempts to draw conclusions on the development of the oasis of Ṭīwī over the past millennia, and on the relations between the coastal area and its hinterland with regard to agriculture and trade.

MATERIALS AND METHODS

Mapping of wadi features

To establish a three-dimensional digital reference map of the wadi (fig. 1) the topography of the rugged surrounding mountains was digitised from maps² with 40 m altitude lines and entered into a Geographical Information System (GIS). Subsequently, major infrastructural features such as roads, modern settlements, the extension of the palm groves and former cropland terraces were mapped using a differential Global Positioning

System (GPS)³ with decimetre precision (fig. 2). Features that could not be mapped on-site due to lacking satellite reception under the steep surrounding cliffs were remotely localised using a LEICA Vector⁴ connected to the Trimble GPS. The position of the inaccessible upper springs of Wādī Ṭīwī was derived from the vegetation pattern shown on ASTER satellite images⁵ with 15 m resolution.

The average density of date palms (*Phoenix dactylifera* L.) was estimated at nine representative locations in the wadi by digital photography. After taking a photograph its corners were geo-referenced using positions taken with the Leica Vector. Subsequently, all palm trees on the photo were counted and divided by the GIS-derived area covered by the image. Informal surveys were conducted to assess the change in the cropping pattern following modernization in the 1970s, the cultivated date palm varieties, the amount of manure applied to the date palms and the approximate number of inhabitants and small ruminants belonging to each of the five villages in the wadi.



PLATE 4: Wadi Tiwi, abandoned terrace fields.

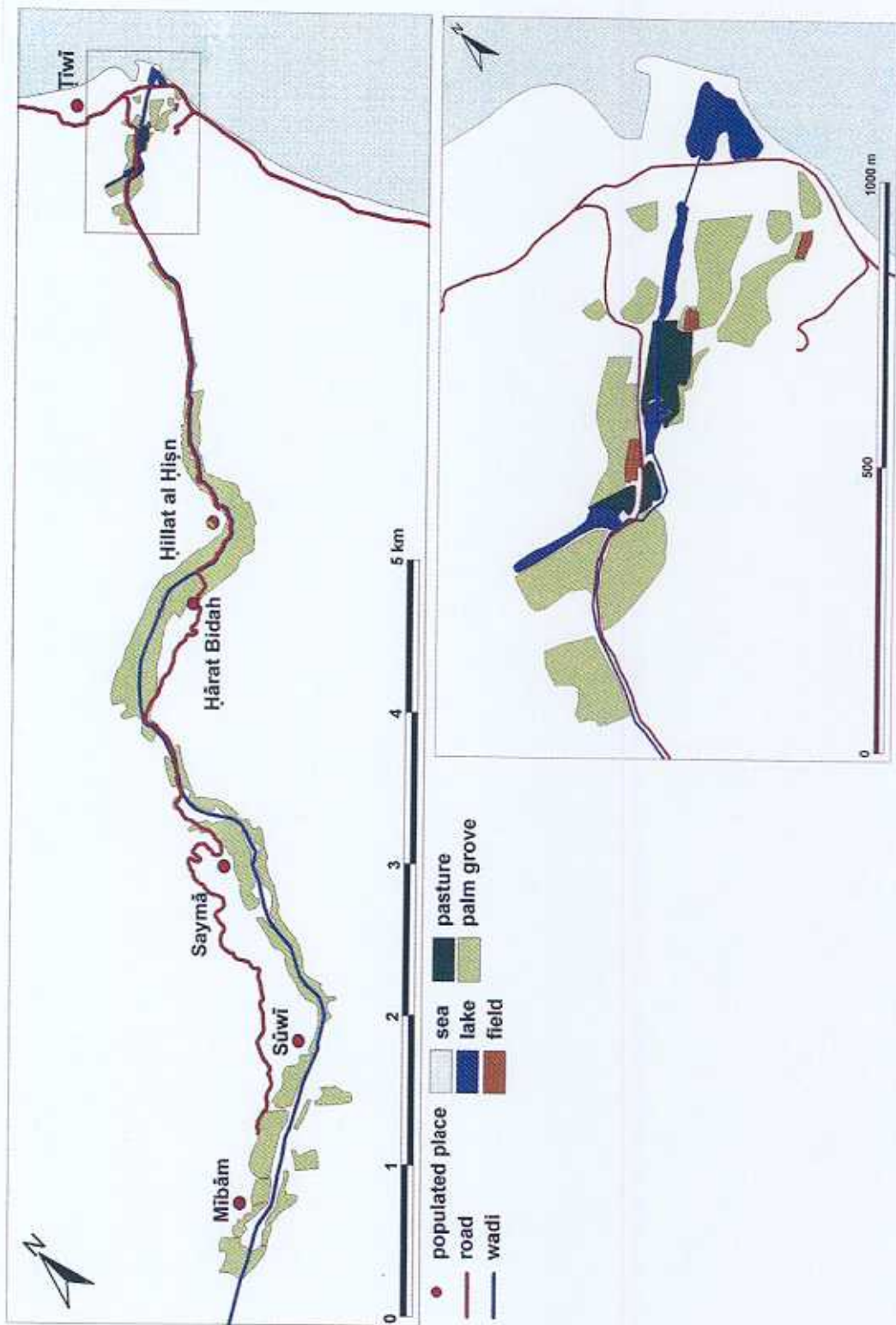


FIGURE 2. Wādī Tīwī land-use map.

Agricultural production and carrying capacity

To estimate the agricultural production of Wādī Ṭīwī and its carrying capacity for small ruminants and the human farming community before and after the modernization of Oman, the following assumptions were made (Table 1):

- (1) Potential evapotranspiration (PET) in the valley could be calculated according to Priestley and Taylor (1972) modified by Shuttleworth (1993). The necessary input data (global radiation and air temperature) came from weather records at Muscat and were adjusted to a mean wadi altitude of 150 m above sea level. Adjustments were also made for the effects of shade on PET based on radiation records taken in the similarly mountain surrounded valley of Balad Sīt from December 2002 to April 2003 (Nagieb *et al.* 2003). Crop coefficients were taken from Allen *et al.* (1998).
- (2) Date yields and energy levels from local palms genotypes remained largely unaffected by modernization. Present day yield levels (10–20 kg DM tree⁻¹ year⁻¹ measured in another oasis of Oman (Nagieb *et al.* unpublished) were in close agreement with data reported from Oman prior to modernization (FAO Stat. 2003).
- (3) The germplasm of cereals, ancient wheat landraces (*Triticum aestivum* L. and *Triticum durum* [Al-Maskri *et al.* 2003]) and sorghum (*Sorghum bicolor* Moench s. l.), has remained largely unchanged over time. Therefore yield levels of cereals reportedly grown on now abandoned terraces in Wādī Ṭīwī before modernization resembled those collected on manure-fertilized fields under similar environmental conditions at Balad Sīt. Yield levels of alfalfa (*Medicago sativa* L.) in Wādī Ṭīwī have experienced similar increases following crop intensification with modernization as observed at Balad Sīt (Nagieb *et al.* 2003). Human energy consumption of an average adult working in traditional labour-intensive irrigation agriculture remained similar over time.
- (4) The largely genetically determined ratio between crop residues and grain yield, also known as harvest index, remained constant

over time and could thus be taken from present day measurements. This ratio was used to account for the contribution of crop residues to animal nutrition in the wadi.

- (5) The annual dry matter yield of fodder grasses in palm groves amounted to about 1/6 of alfalfa yield (the latter is cut up to 12 times per year and intensively fertilized with manure) and entirely used to supplement small ruminants (sheep and goats) sent for day grazing to the largely barren cliffs surrounding the wadi.
- (6) The fraction of dates used as an energy supplement for the nutrition of goats and sheep grazing the desert mountains, the DM intake of these animals and the meat yield per slaughtered animal remained constant over time and was taken from the literature (George 1987).

Archaeological methods

As preparatory work, the area under study was examined on aerial photographs scaled c. 1:20,000. Structures of interest were marked on the photographs and afterwards examined on the ground. Due to topographical conditions and building density, the whole coastal area was surveyed on foot. In Wādī Ṭīwī, the survey concentrated on existing settlements and adjacent areas, as well as on some small plateaus on the otherwise very steep hill flanks. These areas were also surveyed on foot. Date groves were not surveyed since the possibility of finding archaeological remains there is small due to erosion and to continuous agricultural use over centuries.

All settlement ruins, tombs, metal and flint working sites, protective walls, and find scatters were registered with the help of a Global Positioning System (GPS). One set of coordinates was taken for each site. All prehistoric tombs were recorded separately, while Islamic cemeteries were only summarily registered.

Using the aerial photographs, a map was created and rectified on the existing topographical map sheet 'Ṭīwī' scaled 1:100,000. Related attribute data, like kind of site, dating, kind of finds were registered in a database.

A settlement (site TW0002) with remains of the Iron Age and Islamic periods was discovered on a natural terrace above Ṭīwī/Jurayf. The architectural features of this settlement as well as the topography of the site were mapped with the help of a base station by a surveyor.

At most sites all pottery sherds were collected. Only in the settlement sites TW0002 and TW0015 the collection was reduced to diagnostic sherds, for these were sufficient to give an overview of the chronological span and the function of the site. Ware, shape, state of preservation, firing, finishing and provisional dating of each sherd were registered. Since the pottery is still under study, datings of the sites given in this paper must be considered provisional.

Documentation and analysis of the early modern and modern town

On the basis of aerial photographs, a preliminary plan of the topography and the built substance of Ṭīwī was drawn. A closer survey on the ground followed, in which measures were checked. In the resulting, rather detailed town plan, heights and



PLATE 5. Typical view of the upper Wādī Ṭīwī near the spring area with lakes and natural vegetation.

accesses of buildings were marked as well as their current function. The lower part of the old town centre of Ṭīwī (Ar Ramlah) was mapped separately due to its intricate structure. Here, building conditions were also documented. The plans, together with observations on the ground, allowed to determine zones of different age and different use, as well as axes of communication in the urban structure of Ṭīwī.

For the documentation of building types in the old centre of Ar Ramlah, five residential houses were selected for detailed mapping. The cluster of houses II-VI offered itself for documentation because of the accessibility and a certain variety in the plans and size of the houses. Ground plans of both levels and sections were taken.

Informal interviews were conducted with residents of Ṭīwī, on the past and current use of buildings in town, ownership, and the history of the public infrastructure, traffic, and commerce. Most of the information was cross-checked with second informants. Some inhabitants of Ṭīwī were able to identify the location of certain shops in the *suq*. Complementary information came from a handwritten booklet in the possession of Shaykh Khalifa bin Ḥamad bin 'Īsa al Muqaymī. It contains mainly notes on credit given to local merchants for their trade with India and Ceylon in the 1880s. Published travel accounts were checked for information, but turned out to be of little help for the history of Ṭīwī. This contrasts with the value of earlier written sources, from which the role of Ṭīwī in the 14th-16th centuries can be assessed (Ibn Baṭṭūṭa 1979; Albuquerque 1990; Barbosa 1989).

The collected evidence allows to draw conclusions on the history of Ṭīwī in the recent past, i. e. back into the period before the rapid modernization from the 1970s onwards, and on the way in which recent change in the socioeconomic situation of the country afflicted the structure of the town.

RESULTS AND DISCUSSION OF THE AGRICULTURAL SURVEY

The survey and mapping of terrace lands showed that agriculture in Wādī Ṭīwī is largely dominat-



PLATE 6. View of 'Umq Bi'r and the spring area of Wādī Ṭiwi.



PLATE 7. The spring area of Wādī Ṭiwi at 'Umq Bi'r.

ed by palm groves which are occasionally interplanted by banana (*Musa* spp.), lime (*Citrus aurantifolia* [Christm. et Panz.] Swingle) and mango (*Mangifera indica* L.). Palm density varied between 100–200 trees ha⁻¹ near the wadi bottom and >200 trees ha⁻¹ in the terraced groves on its fringes. The surprisingly strong focus of agricultural production on perennial date palm cultivation and the reported abandonment of wheat with modernization is certainly related to the year-round abundance of water in Wādī Ṭīwī. As a consequence of the modernization process the total area dedicated to annual crops declined by almost 2/3 (Table 2) and the remaining surface is planted to vegetables to be sold on the Ṭīwī market rather than to wheat which is imported from overseas. The flow rate of the spring and lake system in the upper part of Wādī Ṭīwī (pls. 5–7) was estimated to at least 4,320 m³ day⁻¹. Additionally to the waters originating from the Maqta' plateau north-west of Wādī Ṭīwī, a number of small tributaries drains the surrounding rock watersheds from the north and south into the wadi and leads to a number of secondary water collection points for the irrigation of palm groves. These secondary sources likely contribute a similar amount of water to the wadi flow as do the springs likely leading to a total flow rate of beyond 8,000 m³ day⁻¹. Given an average annual PET of 2,200 mm, actual evapotranspiration from the palm tree-dominated vegetation belt in Wādī Ṭīwī may amount to only 6,500 m³ day⁻¹ (Table 2). This would explain why even in dry years substantial amounts of excess water drain into the ocean forming lagoons of brackish water along the seashore (fig. 2).

The large variation in banana varieties along the wadi indicate an ancient local cultivation history for this crop of which progenies may have been brought to Ṭīwī in early trading ships from Eastern Africa and Asia. The apparent absence of black sikatoga (caused by *Mycosphaerella fijiensis*) and panama disease (caused by *Fusarium oxysporum* f.sp. *cubense* [Foc]) in banana and the lacking infestation of whitches broom disease (caused by *Crinipellis perniciosa*) in lime are surprising. They likely reflect the relative geographical isolation of Wādī Ṭīwī from other lime growing mountain

oases in the Northern Oman mountains.

Today the most important date palm varieties in Wādī Ṭīwī are Madlūki, Bū Narij, Barnī, Muḥalab, Sallānī and Naghāl to which at present between 40 and 60 kg tree⁻¹ of manure from small ruminants are applied annually. All farmers interviewed stated that water for palm tree irrigation was abundant and if ever needed could also be taken from the wadi floor. Nevertheless, along the entire wadi it is strictly forbidden to pump irrigation water from below the limits of one village back up into the village's territory.

On both sides of the Jabal Banī Jābir mountain range farmers mentioned the existence of formerly important trade routes between Wādī Ṭīwī and the distant mountain oases of 'Umq Bi'r, Jaylah and Maqta', on which dates were exchanged for wheat. Fresh and dried fish were also transported over a network of donkey tracks or footpaths (Nagieb *et al.*, unpublished) from the coast to the oases west of the mountains. Farmers at Maqta' and As Suma'iyah also reported that before modernization dried small fish arriving on donkey loads from Ṭīwī were extensively used to fertilize palm groves and wheat fields.

Current numbers of small ruminants seem to vary during the year between 400–500 at Mībām, 150–200 at Sūwī, 100–150 at Saymā, 150–200 at Ḥārat Bidah and 150–200 at Ḥillat al Ḥiṣn. The last available census reported a total of 695 people for the five villages in the wadi and 2,190 inhabitants for the town of Ṭīwī (Sultanate Oman, Ministry of Economy, Census 1993, Wilāyat Ṣūr). Compared to the early 20th century data reported by Lorimer (1970, 2: 1906f.) the human population of Ṭīwī and Wādī Ṭīwī seem to have declined by 24%. However, it is unclear how reliable Lorimer's data are given his counts of almost 6,000 sheep and goats of which 2,000 reportedly belonged to Mībām alone. Lorimer's figures are much above the estimates of the plant-based animal carrying capacity of the wadi (Table 2) which do, however, not include effects of the unknown amounts of dried fish and fish meal traditionally mixed into in the small ruminants' feed. The carrying capacity data also indicate that before modernization the caloric intake of the wadi's population must have been dominated by date con-

sumption which was certainly complemented by fish and traded wheat. Whereas today's population in the wadi may theoretically still be able to nourish itself from its agricultural activities, the inhabitants of Ṭīwī are obviously dependent on fisheries, long-distance trade and particularly the tertiary sector of the oil-driven economy. From a botanical point of view the reliable abundance of water in Wādī Ṭīwī makes its upper, lake-rich territory below the spring area near 'Umq Bi'r a unique and still partly untouched, niche ecosystem within Oman which certainly merits further botanic research.

RESULTS AND DISCUSSION OF THE ARCHAEOLOGICAL SURVEY

Since Wādī Ṭīwī has a perennial water flow and the ecological conditions are most favourable for sedentary life (as explained above), we expected to find very ancient settlement remains. However, the earliest finds which could be recognized in Wādī Ṭīwī were three pottery sherds of the late Iron Age period (300 B.C.–900 A.D.). They were discovered at site WTW07 (pl. 8) between house ruins of a small hamlet among middle and late Islamic pottery sherds. It is highly questionable whether any of these ruins date back to the late Iron Age. With regard to their building type, it is rather likely that they belong to the Islamic period. This site was the only one situated outside the existing oasis settlements. All other archaeological remains were found within the oasis settlements themselves or in their immediate vicinity such as cemeteries and water installations. The pottery sherds picked up from different rubbish dumps and in the streets of the settlements can be dated from the early Islamic period to modern times. This leads to the assumption that the Wādī Ṭīwī has been continuously inhabited from the 9th or 10th century AD until today. It is difficult to determine whether architectural remains date back to the early and middle Islamic periods. On the whole, this seems unlikely, because space for the construction of houses is extremely limited in the wadi, due to the steep slopes and cliffs. It can be assumed that houses were built continuously

on the same spot so that older structures have vanished.

Turning from the wadi to the coastal strip between Ash Shāb and Ṭīwī, the question arises whether occupational development on the shore was similar to that of Wādī Ṭīwī, and how the two ecologically different zones were related. From earlier studies mentioned above, the existence of shell middens is known as well as settlement remains dated to the Stone Age, others to the Middle Ages. However, a large gap remained between these chronological corner points.

Local geographical features make it clear that the mouth of Wādī Ṭīwī has always offered far better conditions for human settlements than that of Wādī ash Shāb: Here, the steep cliffs make access to the wadi entrance difficult, and a lagoon (*khawr*) prohibits easy entrance into the wadi. In contrast, Wādī Ṭīwī widens considerably towards the coast as the cliffs become lower (pl. 3). On the south side, the mouth of the wadi is flanked by a steep rock. It can be climbed through a saddle which connects it with the adjacent mountain to the south, and from the top of the rock the entrance to the wadi can be easily controlled. At the other side of the wadi, the existing old town centre of Tiwi is located slightly off the wadi entrance to the north. Here, the mountain slope forms several terraces on different levels (as mentioned above). The lowest terrace, a step about 40 m high at a distance of c. 400 m from the shore, overlooks the beach and its gravel plain. Some ravines running down the slope cut through the terrace and cross the beach plain. From the southernmost of these ravines, c. 600 m from the wadi mouth, a cliff of c. 4 m height stretches south-eastwards, distinctly separating the upper part of the plain from the beach. The cliff ends in a flat spur which protrudes into the wadi mouth.

In Ṭīwī, the oldest datable remains are about 130 tombs of the late 4th to early 3rd millennium BC (fig. 3). They present themselves as circular stone structures with one to four double ring walls (pl. 9). These tombs measure 2–8 m in diameter, their original height being c. 2.5–3 m. They can be assigned to the Ḥafit-type of tombs, well known from other sites in the U. A. E. and Oman. The tombs are situated at the entrance of Wādī

Ṭīwī, on the edges of some ravines, which cross the natural terraces above Ṭīwī, as well as along the coast line. For the contemporaries, the view of these clusters of tombs from the sea must have been impressive. No settlement remains of this period were found. Therefore, it must be assumed that people lived in perishable shelters.

Presumably, their economic basis consisted of marine resources on the one hand and the breeding of sheep and goats on the other. No hints of agricultural activities were found. The position of the Ḥafīṭ tombs at the entrances to the larger wadis (Wādī Ṭīwī and Wādī ash Shāb), but also to the small wadis and ravines, mark the key points

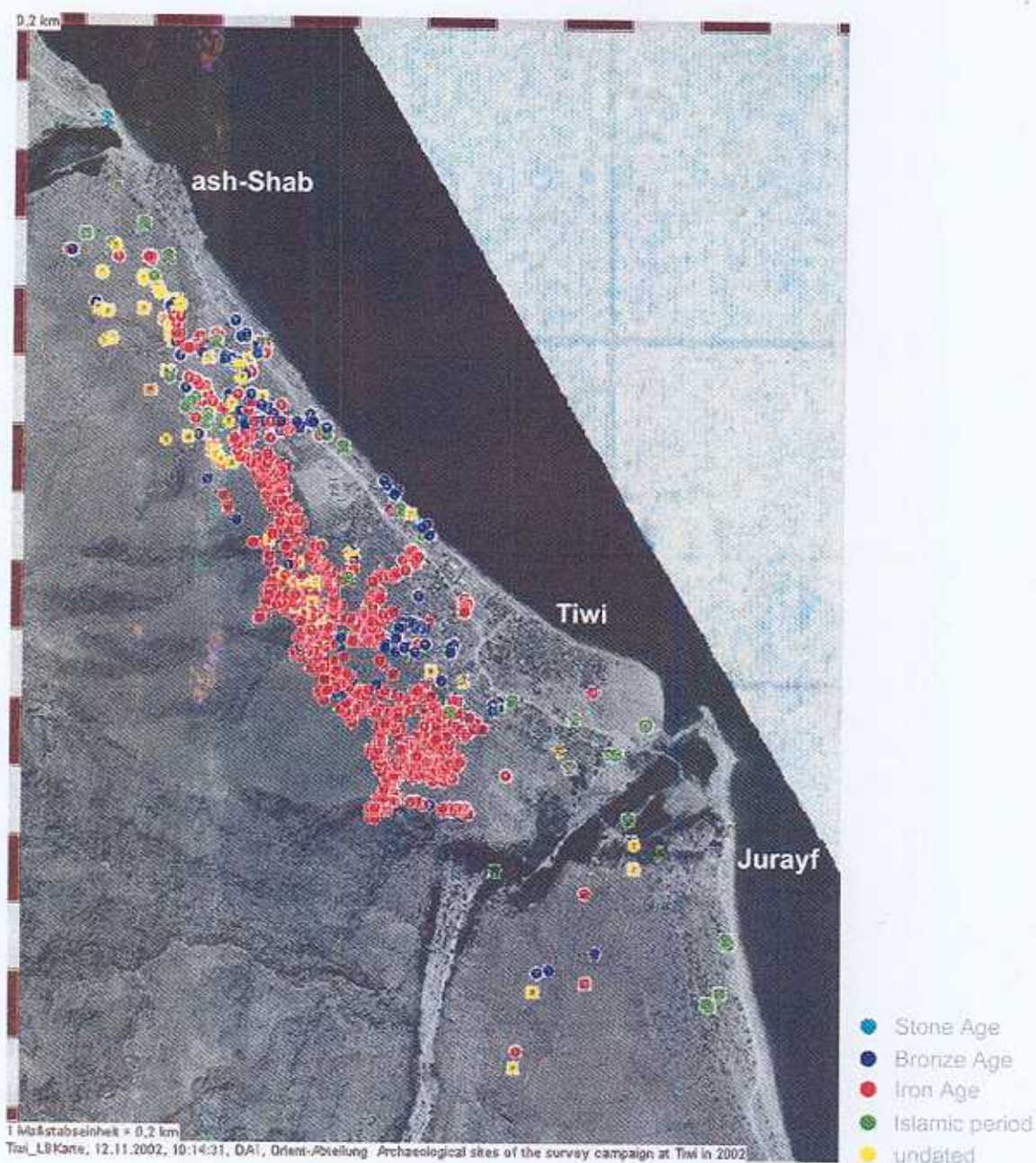


FIGURE 3. Ṭīwī Map of archaeological sites.



PLATE 8. Settlement ruins in Wādī Tīwī, site WTW07.



PLATE 9. Dilapidated Hafit-type tomb with Wādī Sūq secondary burial TW0494 in the foreground and two early Iron Age burials (TW0495 on the right side and TW0496 on the background).

for access to the coastal hinterland. Such positions are typical for Ḥafīt-type tombs, and one may ask for the underlying reason. Possibly, they were built as landmarks, signposting the accesses to trade routes to inland sites. If this assumption is correct, the trade routes for the exchange of goods between the coast and the interior described above, which were an important feature of Ṭīwī's economy until just a generation ago, might go back as far as to the early 3rd millennium BC.

During the following periods, i.e. the second half of the 3rd millennium and the 2nd millennium BC, the occupation of the Ṭīwī - Ash Shāb area is only reflected by secondary burials inside Ḥafīt tombs (Schreiber and Häser, in press). This is evidenced by some sherds of painted black-on-red and black-on-grey ware, dated to the Umm an Nar period as well as some incised softstone vessels dated to the Wādī Sūq period. Neither typical tombs nor settlement remains of these periods were recognized. This leads to the assumption that habitation in this region was only temporary, for example for seasonal fishing or grazing.

However, grave goods of later periods were also found in Ḥafīt-type tombs. As an example, a secondary burial of early Iron Age date was recorded within the almost completely dilapidated tomb TW0267. The tomb was constructed of five ring walls of large stones with a diameter of 8 m. Only two layers of stones have remained. Due to the tomb's poor state of preservation, the entrance to the central, almost circular chamber of 1 m width could not be determined. Inside the chamber, splinters of bones, two bronze arrow heads, and a stamp seal were discovered (pl. 10). On the square face of the pyramid-shaped seal, the representation of a stylized ostrich is depicted. Similar seals have been found in Rumaylah, Qarn Bint Sa'ūd, and Ḥilī in the U.A.E. as well as in Al Maqsha on the Island of Bahrain. These seals can be dated to the Iron II period (1100-600 B.C.). For Oman, it is the first early Iron Age seal reported so far. It was probably produced in South-eastern Arabia, but the find points to connections with Mesopotamia, Syria, Anatolia and the Levant (Häser and Schreiber, in press).

This example was the most spectacular, but not the only secondary burial of the early Iron Age. In

other cases, a rectangular softstone lid and some pottery sherds were found.

The oldest settlement remains that were discovered at Ṭīwī date back to the same period. Some pottery sherds of domestic wares were found in the mountain saddle above Ṭīwī/Jurayf, south of Wādī Ṭīwī (TW0002). The place was well chosen with respect to protection, because its access is impeded by the steep, rocky slopes to the east and south-west; from the other sides, the settlement was practically inaccessible. Neither is there a direct view onto the site from the coast or from the wadi. This was also the reason why this site remained undiscovered until the 2002 survey. Remains of rectangular houses, terraces and protective walls were found (fig. 4). Houses were built on the slopes on the north and south side of the saddle, erected with double walls of stones and founded on massive terraces. Protective walls of large boulders are situated on the east and on the south-south-west side of the settlement area. The wall on the east side protects the entrance to the settlement against the coast, that on the south-south-west side against the wadi. These architectural remains are presumably not of early Iron Age date, because only few potsherds of this period were found. Therefore, this site can be considered a very small protective place, possibly used for short term visits.

However, the site developed to a substantial village. Pottery sherds of late Iron Age (300 B.C.-900 A.D.) and Islamic date have been collected in large quantities. According to our detailed survey of the architecture, it may be assumed that the oldest building remains are situated on the north-western slope of the area (pl. 11). There, houses and terraces built of very large stones in a special building technique can be recognized. However, they were presumably re-used in the Islamic period, and in fact, it is difficult to determine without excavation which walls belong to the original buildings. Nevertheless, the distribution of pottery sherds supports our dating.

Apart from terraces used as foundations for houses, others were found without any signs of construction on top. First, we speculated that they might have been used for agricultural purposes. However, further examination showed on the one



FIGURE 4. Settlement ruins in the mountain saddle above Tīwī/Al Jurayf (TW0002), plan.

hand that no falaj for irrigation ever existed at this site, and on the other hand that the position of the terraces is generally unsuitable for agriculture. Therefore, the original hypothesis was dismissed, and it seems plausible that these terraces were equally used as foundations for houses the remains of which have vanished, due to erosion on the steep slopes.

The occupation of the late Iron Age period must have been relatively dense, since a cemetery with 950 tombs has been discovered, which can be assigned to this period. This cemetery is situated on the natural terrace, north of Wādī Tīwī and west of Tīwī and Ash Shāb. The tombs are built on the ground and have a simple layout. The basic design is a round or oval double wall of large, irregular, corbelled stones (pl. 12). The roof consists of large flat stones, and small stones are piled on top of them. The dimensions range from 1.8 m - 4.6 m in length, 0.8 m - 2.5 m in width and 1.0 m - 1.7 m in height. The chambers are also round or oval and the dimensions vary from 1.1 m - 2.8

m in length, 0.5 m - 1.5 m in width and 0.4 m - 1.0 m in height. In many cases the tombs are built on the slope using it as the back side. There are also many tombs constructed in front of large boulders, which lie on the terrace above Tiwi. Frequently, these boulders were used for more than one tomb. The orientation of the tombs seems to depend rather on the topographical situation than on religious ideas. Since the tomb chambers are not large, it is assumed that they were occupied by one or at the most two persons. However, bones are badly preserved, and only excavations might clarify the situation. Pottery sherds were found sometimes inside, but in most cases outside the tombs. This is due to the fact that all tombs were looted, presumably already in ancient times. The pottery is of late Iron Age date and can be assigned to assemblages that are known from the large cemeteries at Samad ash Shān on the south-eastern foot of the Hajar mountains (Yule 2001). Additionally to the pottery, various kinds of molluscs and fishbones were found in the



PLATE 10. Pyramidal seal with ostrich depiction in its finding context in the chamber of tomb TW0267.



PLATE 11. Settlement ruins in the mountain saddle above Tīwī/Jurayf (TW0002). View from south-east onto the north-western slope, showing the probably oldest architectural remains of the settlement. The hill is crowned by a late Islamic watchtower.

tombs. At Ṭīwī, this points to a strong relation to the sea. However, in the graves at the inland site of Samad molluscs were also frequently found. At least, it is proven that people at this time made use of the marine resources. On the other hand, it is more than probable that the inhabitants of Ṭīwī kept small ruminants (sheep and goats). Additionally, the few sherds in the small hamlet site WTW07 in Wādī Ṭīwī indicate the use and/or occupation of the wadi, and one might assume that this was for agricultural purposes.

In the early 14th century, Ibn Baṭṭūṭa (1979, 2: 226f.) calls Ṭīwī a village (*ḡaryah*). When he appreciates the beauty of the place for the running canals, the lush green and ample fruit, he is evidently talking of the wadi. More specifically, he mentions bananas which are called '*al munwarī*', derived from the Persian word for 'pearl' (*murvarid*). As a further product of the wadi, he mentions betel. His remark that dates are imported to this region from Oman (i. e. from the inland part of the country) seems rather odd, given the ideal conditions for date plantation in the wadi. It seems clear that the settlement of Ibn Baṭṭūṭa's days was connected with neighbouring regions around the Gulf, and was no longer an isolated fortified village on the mountain above the wadi mouth (if it had ever been restricted to that role). At some point during the early Islamic period, the settlement location had shifted from the terrace above Ṭīwī/Jurayf down to the beach plain where a small settlement still exists under the name of Jurayf. At this site, heavily dilapidated remains of houses are still visible (pl. 13). The pottery from this area can be dated to the 8th to 16th century AD. Only few sherds seem to be of a later date.

It is generally assumed that Ṭīwī fell victim to the campaign in which Afonso de Albuquerque subjected the coastal regions of the Gulf of Oman to Portuguese control. As he reports to the Portuguese viceroy of India, his principal achievement was the conquest of Hormuz in October 1507. On the same campaign, he occupied Muscat by force and destroyed Quriyyāt. The Hormuzi nobles governing nearby Qalhat successfully dissembled with the Portuguese on their first arrival offshore in 1507, provisioning the fleet and promising to ally themselves with the King of Portugal.

However, the Portuguese returned the following year to sack and torch the city after what it perceived as the double-dealing of the Hormuzi governor there. (Albuquerque 1990: 56-59). Ṭīwī is not mentioned in the report. From this silence, one might conclude that either Ṭīwī was not attacked by Albuquerque, or that the town was not important enough to be noted in the report. In the oral tradition of Ṭīwī, the Portuguese invasion is kept alive in the naming of a few tombs in the large south-eastern cemetery adjacent to Jurayf as 'Portuguese tombs' (*maqbarat al burtuqāliyyīn*). Whether damaged by Portuguese cannon fire or not, the fact that Ṭīwī continued to exist is proven by its occurrence in the book by Duarte Barbosa on the coastlands of the Arabian Sea and the Indian Ocean, written in 1518 (Barbosa 1989: 69).

It was probably during the middle Islamic period that a small citadel was built on the terrace above Ṭīwī/Jurayf (TW0002). Maybe also some of the houses north and south of the saddle can be attributed to this period. However, this settlement was most likely only used in case of invasions, since the unprotected coastal site of Jurayf also existed in the same period. The simple ground plans of the houses on the saddle differ radically from the more elaborate courtyard houses recorded in the traditional centre of the current settlement of Ṭīwī. The relation between these different building types has still to be determined.

The early and middle Islamic pottery assemblage shows a broad variety of different imports from Persia as well as China and links Ṭīwī with the Arabian Sea and Gulf trade.

Ṭīwī was not as important as Qalhāt at this time, but due to the abundant sweet water supply ships berthed to take water. Duarte Barbosa mentions Ṭīwī for this reason: 'It is of no great size, and has a good supply of water, so that all ships which sail these seas come hither to take in water.' (Barbosa 1989: 69). Surely, also in this period trade was not the only income of the inhabitants of Ṭīwī. The main income came probably still from the exploitation of the marine resources and the agriculture in Wādī Ṭīwī. All oases in Wādī Ṭīwī were inhabited at this time and produced bananas, as Ibn Baṭṭūṭa's report shows.

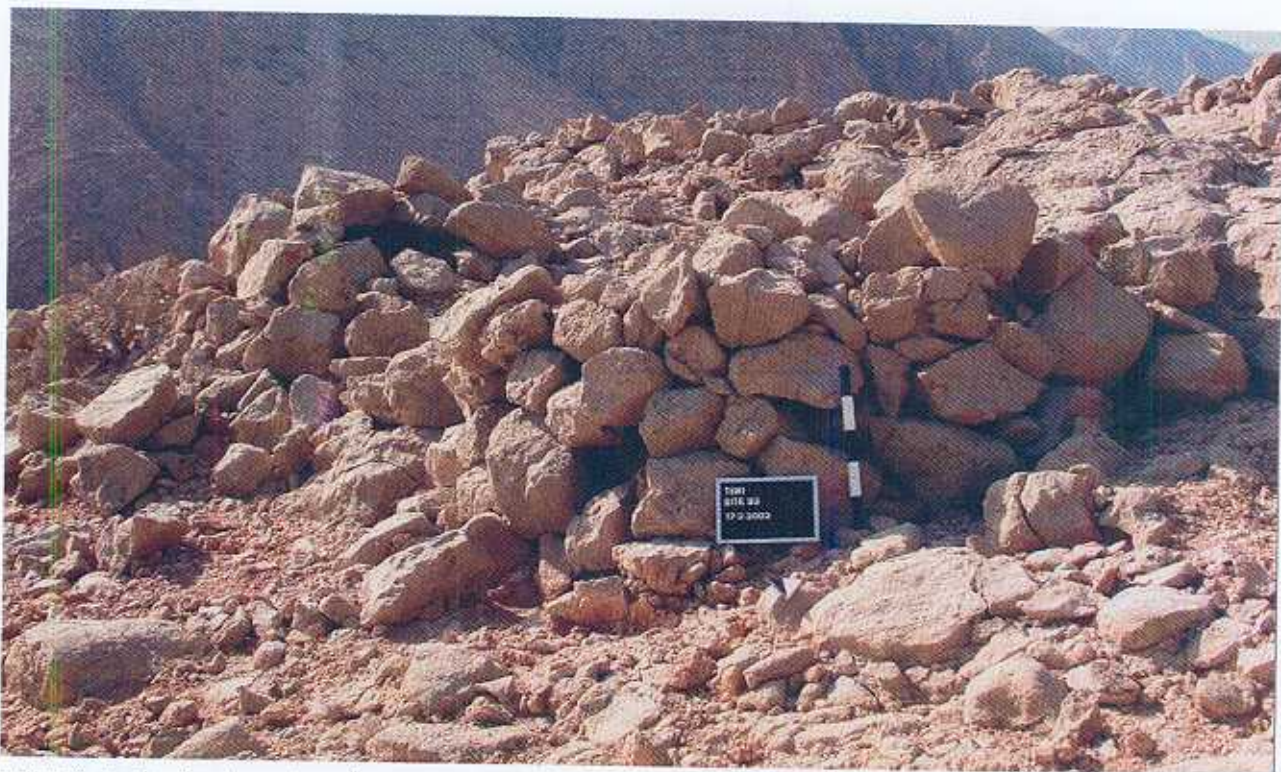


PLATE 12. Two late Iron Age tombs on the terrace north of Wādī Ṭīwī and west of Ṭīwī. Behind tomb TW0033 in the foreground, tomb TW0028 is visible.



PLATE 13. Dilapidated settlement ruins of the early and middle Islamic site of Ṭīwī/Al Jurayf (TW0015).

The large Islamic cemetery with approximately 3000 to 4000 graves situated south of Ṭīwī/Jurayf has yielded middle Islamic pottery sherds, which were scattered on the tombs. Ibrahim and ElMahi (2000: 127) have already proposed that this cemetery was used by the inhabitants of the middle Islamic town of Ṭīwī/Jurayf. Another large cemetery is situated on the western side of the mouth of Wādī Ṭīwī. It encompassed c. 1000–2000 graves. On the surface of the cemetery, pottery sherds of early, middle and late Islamic date were found.

Neither building remains nor pottery sherds of early and middle Islamic date have been found within the limits of the current settlement of Ṭīwī and Ash Shāb. Two reasons for this lack of evidence can be adduced: Continuous occupation of the site might have erased earlier traces, or no settlement existed in that area in the early and middle Islamic period. There is no positive proof for either of the two hypotheses. However, given that remains of some Bronze Age and late Iron Age tombs have survived amidst the thriving settlement of Ṭīwī, it would be curious if all early and middle Islamic traces had completely vanished.

RESULTS AND DISCUSSION OF THE ARCHITECTURAL SURVEY

Traditional urban structure and architecture

A bipartite structure appears to be one basic feature in the topography and sociology of Ṭīwī. The built-up area is organized around two old cores (fig. 5, pl. 14), each of which is dominated by one tribe. A first glance at the map shows that the larger part of the old town, named 'Ar Ramlah', extends along the shore, covering an area of approximately 400 × 160 m. The second old part of the town is called 'Ar Raf'ah', a name justified by its slightly elevated situation on the foot of the mountain. It is separated from Ar Ramlah by the low cliff mentioned above. Ar Raf'ah stretches over 320 m along the slope, with a narrow part projecting to the south-east on the outcrop of the rocky step which protrudes into the wadi (pl. 15). Ar Ramlah is mainly inhabited by members of the Muqaymī tribe, while the majority of the popula-

tion of Ar Raf'ah belongs to the Salūt. Both tribes are factions of the Banī Jābir. Also, Salmānī, Sinānī, Qalhātī, Sā'dī, Fārsī, and Zidjālī are attested as family names.

The two parts are separated by a vacant strip of land of 30–80 m width, which extends from the crossing of the paved road with the small northern wadi, along the foot of the low cliff, until it opens into the vast cemetery to the south-east. This intermediate area is crossed by several paths. In particular, one of them leads from a small square on the southern margin of Ar Ramlah, where the closed outer fronts of the houses leave a broad gap, across the open area to a passage up the cliff using some broad steps. Here, it meets the paved main road on a small square with several shops. Apparently, this path served as the main connection between the two parts of the town where the intermediate area is narrowest. Additionally, it is marked by a large sidr tree (*Ziziphus spina-christi* L. Desf.) at the foot of the stairs to the cliff.

In their internal structure, the two parts of the town share one basic feature: Both can be subdivided into a western part with a maze of narrow, winding streets, intersecting and bifurcating at irregular angles, and an eastern part of more regular structure, with wider lanes running more or less parallel or at right angle to the coastline. This seems to indicate that the irregular parts belong to an earlier phase (assuming that rebuilding and encroachment have blurred the potentially more regular earlier plan), while the sections built in a more regular fashion belong to a more recent phase in which the settlement was extended to one side. At least, this explanation would be in keeping with the structural differentiation which has been noted in the development of many Near Eastern towns and cities since the Arabic-Islamic conquest (Wirth 2000: 34–48).

Apart from this basic subdivision, the two parts display structures quite different from each other. In the north-western (presumably older) part of Ar Raf'ah, the contour lines of the mountain slope constitute the first determining factor of spatial organisation. On different levels rising to the south-west, the houses are arranged in a north-west-south-easterly direction. This primary

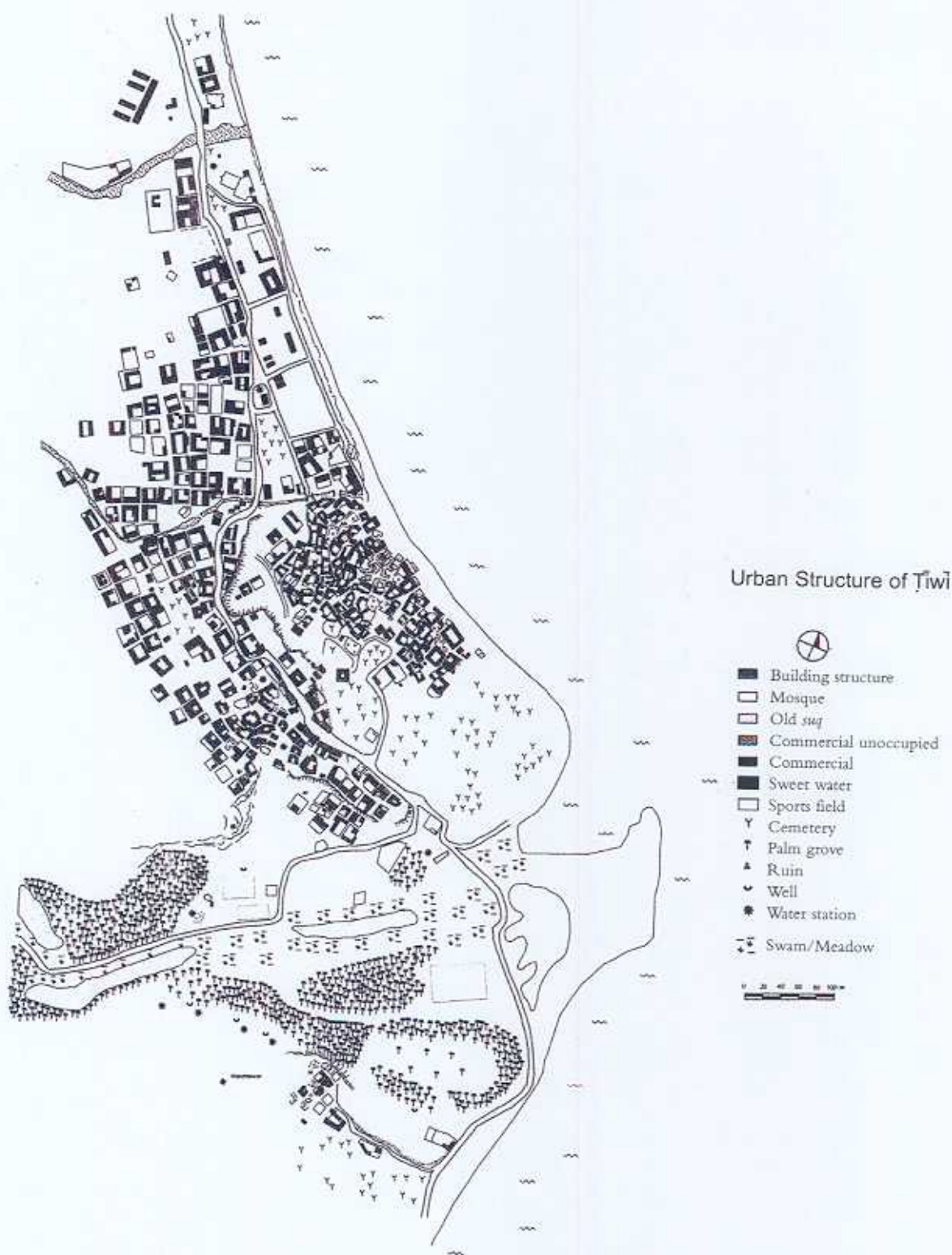


FIGURE 5. Tiwi General plan of the town south of the modern school.



PLATE 14. Ṭiwi. View over the old town centre, from SW.

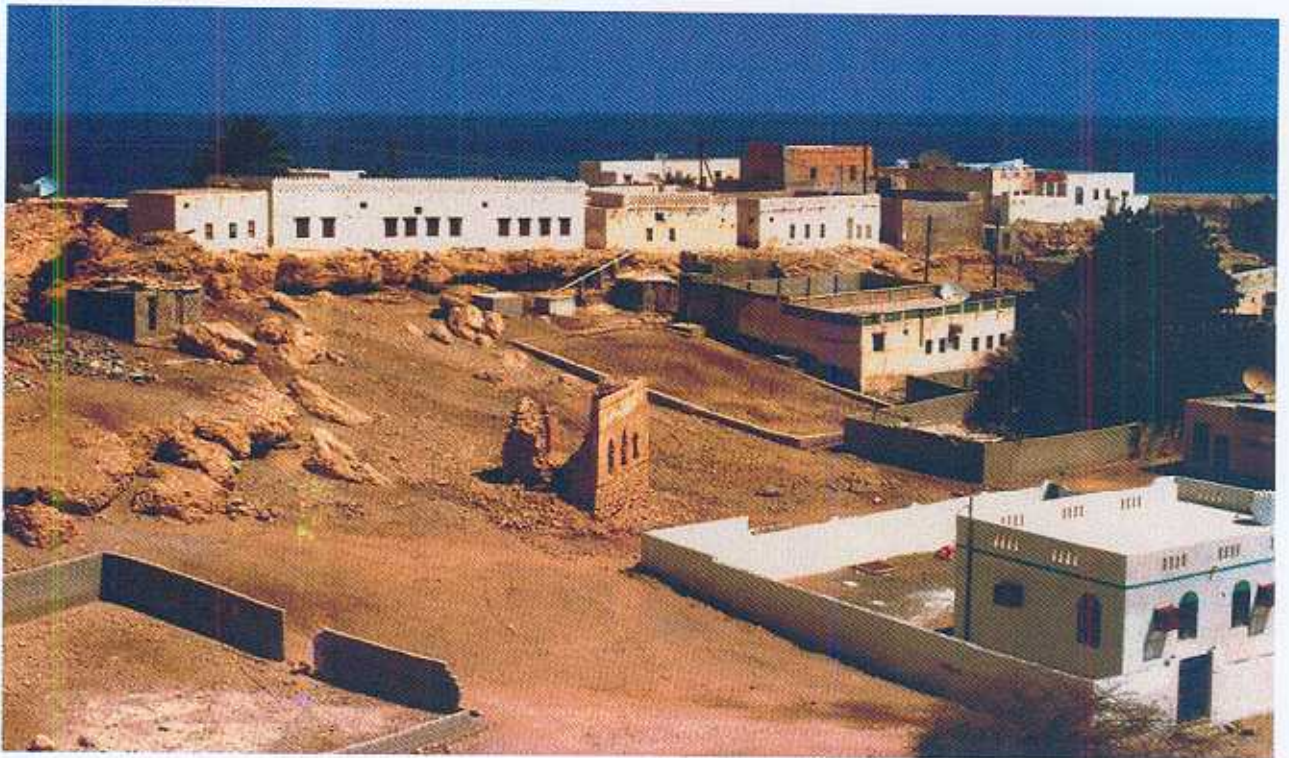


PLATE 15. Ṭiwi/Ar Raḥah. View from SW.

direction is countered by the north-south line connecting Ar Raf'ah with Ar Ramlah, which continues southwards across Ar Raf'ah plateau as a broad gap between the houses and descends into the wadi. Consequently, a concentration of shops is found at the intersection of the north-south axis with the paved road. Further up, the mosque of Ar Raf'ah is situated on the same axis overlooking the descent into the wadi. In the south-east, the arrangement of houses in two rows lined up on a central alley is naturally determined by the margin of the spur on which they are built.

The densely built western half of Ar Ramlah presents itself as a more complicated web of bent alleys and narrow passages (fig. 6). It is protected against the outside by lines of houses built next to each other, which must have made the impression of a 'city wall' on Lorimer (1970, 2:1906). In fact, the western entrance to Ar Ramlah is built as a bent passage through the ground floor of a house. Although there are no traces of leaves to shut the passageway, it is justly named a city gate (*dinwāzah*) by the residents. Like a funnel, the contiguous façades of the adjacent houses lead to the gate. Even more important seems the other access to Ar Ramlah, from the intermediate zone described above. The path from Ar Raf'ah terminates on a small square which opens in the line of house façades on the southern side of Ar Ramlah. From here, an axis runs across the whole built area to house I, which figures prominently on the waterfront of Ar Ramlah (there are two branches of this axis, bifurcating halfway to house I and leading to the two corners of the square in front of it).

From this axis, the *dirwaza* can be reached by a connecting lane, and a secondary axis runs straight to the north-western end of Ar Ramlah on the beach. From the southern square, another highly important passage leads to the north-east into the *sūq*. Perhaps, the original approach to the *sūq* from this side was wider than it is now: The passages on both sides of house II appear extremely narrow, and the squeezed ground plan of house II itself suggests that it is a late addition which had to take account of given limits. Equally, the elongated house south of it, with its comparatively small courtyard, could be a later addition occupying a formerly open square.

The religious centre of Ar Ramlah used to be Al Maşjid ad Dākhil, the mosque situated at the extreme west of this part of the town (information by Aḥmad bin Mubārak al Muqaymī and Nāşir bin 'Abdallah al Muqaymī). In its present state, the building shows no signs of its age and former significance. One might wonder whether a Friday mosque might not have existed close to the *sūq* at some time; but there are not hints to the existence of such a mosque either in the ground plan of the town, or in the oral tradition of Ṭīwī's population.

Water supply in Ṭīwī functioned through wells. There are traces of disused wells in the intermediate zone at the foot of the cliff below Ar Raf'ah, which may have catered for the needs of some inhabitants of Ar Ramlah. However, it seems clear that most people in Tiwi received their water from wells in the wadi mouth, where ground water is more abundant. In Ar Ramlah itself, which is slightly elevated against the intermediate zone, there are no traces of public wells, and none were discovered in the visited houses. Donkeys were used to transport water from the wells to the houses.

The traditional building types of residential houses in Ṭīwī vary between the fortified tower-house and the rather stretched rectangular houses with a considerably number of external windows. Both types comprise a courtyard. The discerning element of the tower-houses is the self-contained part of the ensemble in the shape of a tower on a square plan, with two storeys on a solid basis. The defensive character is underlined by the use of arrow-slits instead of windows, at least in the lower storey. An example is the house owned by Sālim bin Khamīs as Saḥī on the western fringe of Ar Raf'ah, where both storeys are divided into two oblong rooms, and the high parapet of the roof platform features crenellations and numerous loopholes (pl. 16).

The unfortified houses vary considerably in size (fig. 9a, 9b). Almost exclusively, the buildings are organized in small modules lining the single central courtyard. The depth of the rooms is traditionally limited to 2.5 m by the span of beams made of quartered palm trunks. Most typical is the two-storeyed residential wing with large external

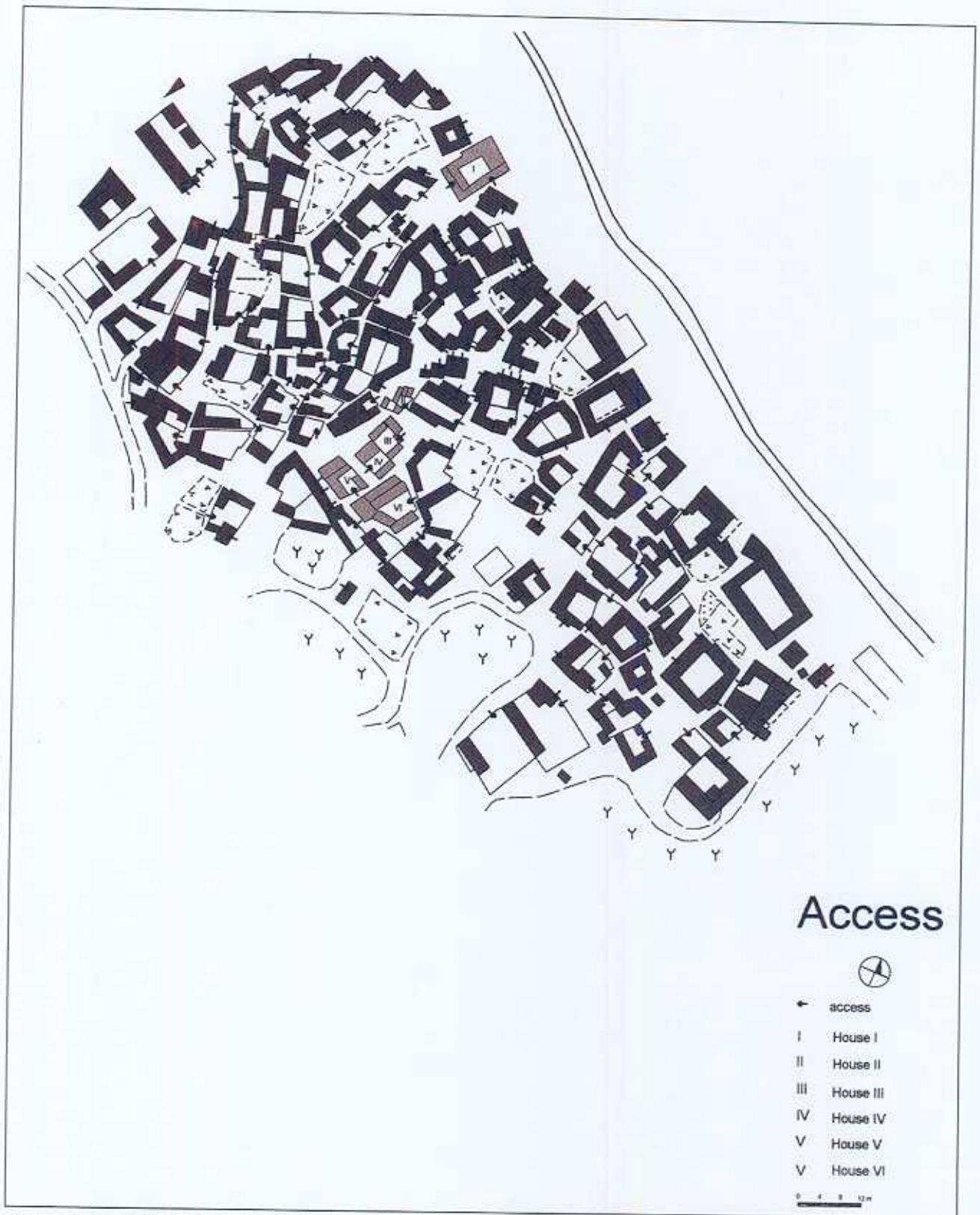


FIGURE 6. Plan of Tīwī/Ar-Ramlah showing entrances, as well as houses for which ground plans were drawn.

windows: The lower storey comprises stables or storage rooms with an arched portico in front, while the upper storey is occupied by the reception room or living room with a terrace to the courtyard side (pls. 17, 18). The large windows on the outside can be considered a concession to the humid climate; they capture the slightest breeze. Comparatively rich examples of this type can be seen in house VI, and particularly in house I, where the reception room is located on the ground floor, while the first floor serves private purposes. House III shows a rather reduced type with a small reception room on top of low stables and storerooms.

The appearance of the traditional houses is in many respects a consequence of their construction techniques. The mud-plastered stone walls are slightly battered to reach greater stability. Upper storeys and roof parapets are set off against the lower parts with cornices made of a layer of projecting stones, which prevent rainwater from running down the wall and destroying the plaster. The aesthetic principle of framing bands extends also to the corners of houses, which are emphasized by ledges, and to the bands around windows. Decorative detail is less frequent, but occasionally, geometrical ornament is found on window frames. The wooden fittings (door-jamb and leaves) and wrought iron window grills, however, give an opportunity to apply ornament. The houses of Ṭīwī have parallels in adjacent regions, as similar principles of layout and construction techniques can be observed in several places around the Gulf (Ghazbanpour 2001: 214–221, with examples from Bushir).

The old suq and traditional trade in Ṭīwī

The central section of Ar Ramlah, stretching down to the beach, is occupied by the old *suq* (fig. 7). Until the early 1990s, this was the commercial centre of the whole region. People used to travel to the *suq* a whole day from places like 'Umq Bi'r in the upper Wādī Ṭīwī, or two days from Maqta' on the western slope of the Ḥajar mountains (Siebert *et al.*, 2003).

According to the memories of residents of

Ṭīwī, the *suq* consisted of c. 60 shops. In our survey, we counted as many as 45 separate buildings which could have served as shops. In addition, a handful of shops were integrated into residential houses, in which they were discernible by their façade with ground floor windows flanking the central door. However, most of the shops in the *suq* were self-contained buildings on a rectangular plan, forming a single room of 3 x 6 m or smaller. Normally, the façade opens to the street with a central door of two leaves, and two flanking windows (pl. 19).

The short main street of the *suq* runs east-west and branches off from the north-south axis described above, while secondary lanes connect it with the other parts of the town and give access to the beach. All streets are open to the sky and show no signs of roofing. The main access to the *suq* for visitors coming from Wādī Ṭīwī and other inland destinations seems to have been from the south-west, through the narrow passages past the outer walls of house II. At least, this seems to have been the easiest connection to Ar Raf'ah. Another approach could be taken through the cemetery and the open area to the south-east of Ar Ramlah, then again through some narrow passages between the houses lining the main *suq* street.

In the majority of the shops, a mixed assortment of groceries, textiles and palm products was on offer. An open space on the main street was used for the trade of livestock and fodder. Specialization can be seen in a carpenter's shop and a trade of boat-tackle, and even a silversmith could be found. The *suq* was not divided according to tribal affiliation (information by Aḥmad bin Mubārak al Muqaymī and Sālim bin Sulaymān al Fārsī). On the occasion of festivities, processions took their way through the main street of the *suq* – a habit which is still practised today, despite the fundamental change in the structure of the town. A highly important place in the commercial life of Tiwi was held by the production of dried fish. It was organized along the way from the beach, on which the fishing-boats were pulled, to the terraces in front of the first shops on the beach, where the fish was cleaned and drawn, to the salting and packing in the adjacent buildings, until the fish was stored and finally sold in the shops



Functions



FIGURE 7. Plan of Tīwī/Ar Ramlah showing functions.

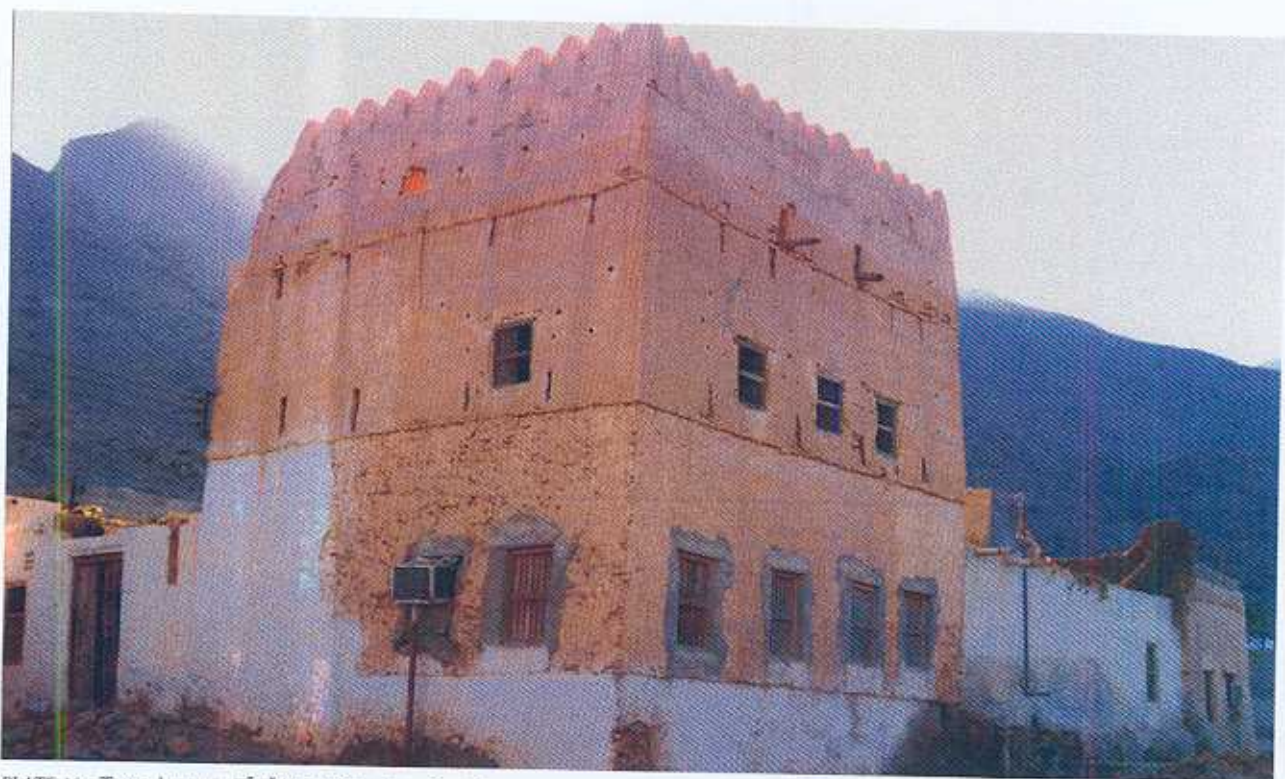


PLATE 16. Tower house in Īwī/Ar Raḥab, view from E.



PLATE 17. Īwī, House VI. Courtyard view from S.

further up. Some of the large square cans in which the fish was traded can still be seen lying in disused shops in the *suq*. As stated above, dried small fish was traditionally traded inland to serve as fertilizer.

The importance of the sea for Ṭīwī is underlined by the fact that until few years ago, traffic was only possible by ship or by donkey. Thus, a visit to the capital involved a journey of 2-5 days by sailed vessels, or one day on a motor vessel (according to Sālim bin Sulaymān al Fārsī). Wealthier inhabitants of Ṭīwī used sea-going ships not only for transport along the coast of Oman, but also for trade within the wider region of the Gulf and on the routes to the Indian subcontinent. According to the notebook in the possession of Shaykh Khalīl bin Ḥamad bin 'Īsa, commercial enterprises undertaken by members of the Muqaymī tribe were mainly directed to the Indian subcontinent. In the 1870-80s, the majority of trips went to Ceylon for rice, coffee, and soap. It is clear that these goods were not primarily destined to be traded inland from the *suq* of Ṭīwī, but were shipped to other places on the Gulf. Thus, capital was flowing to Ṭīwī from trade between third parties, and it can be assumed that some of the large houses in Ṭīwī were built from money made by the sea merchants who merely happened to call this town their home.

Nowadays, the *suq* of Ṭīwī is almost destroyed (fig. 8, pl. 20). Of the shops, about one third is completely ruined, another third is severely threatened by collapsing roofs, and the remaining third could be called more or less intact. Padlocks on a few doors indicate current use of some shops as storage space.

Structural change in commercial life and in the residential areas

From the archaeological record and the written sources, it is difficult to reconstruct the history of transformation in the settlement of Ṭīwī in the Islamic period. A major problem is to determine the earliest date at which a settlement existed in the current traditional town centre. Although no visible remains prove the existence of a settlement

in the place of Ar Ramlah or Ar Raf'ah earlier than, perhaps, the 19th century, one would hesitate to exclude it altogether. Rather, one might assume that a smaller part of Ṭīwī might have existed in this place at an early stage. The increased importance of Omani maritime trade from the 17th century onwards might have encouraged the growth of Ar Ramlah and Ar Raf'ah at the expense of the older settlement at Jurayf with its restricted space on the beach plain. Lacking the archaeological evidence, these hypotheses cannot, however, be substantiated.

Conclusions on later phases of urban change are possible on the basis of the built substance. It has already been mentioned that the more regular layout of the south-eastern parts of both Ar Raf'ah and Ar Ramlah could indicate that they belong to a phase of enlargement of the settlement, although no date for this enlargement has hitherto been determined. Other, more recent changes are visible in the buildings themselves (fig. 8): Throughout the traditional parts of the town, houses of the traditional type can be found which have been built with modern materials, i. e. with masonry of cinder blocks and ceilings constructed of sawn teak beams. These houses can be regarded as the first indicators of economic change after 1970, when it became possible to ship large quantities of building materials to Ṭīwī. The next stage of change is marked by buildings of a different type, constructed for electric air condition, with large windows even on the ground floor and a minimized courtyard.

The recent spatial reorganization of Ṭīwī was prompted by the construction of a dirt road connecting Quriyyāt with Ṣūr along the coast in 1992. As an immediate consequence, the maritime trade of Ṭīwī lost its importance. The *suq* was evacuated within a few years; its last shop was closed down in 1995. A new commercial district originated on the new main road: Almost the whole length of the thoroughfare (turned into a tarmac road within the town in order to reduce dusting) is dotted with a similar assortment of shops as previously found in the *suq* (pl. 21). 'Foodstuff' signs dominate the scene, followed by 'mens' and 'ladies tailoring' respectively. The next frequent category of shops, signposted as 'building contractors', con-

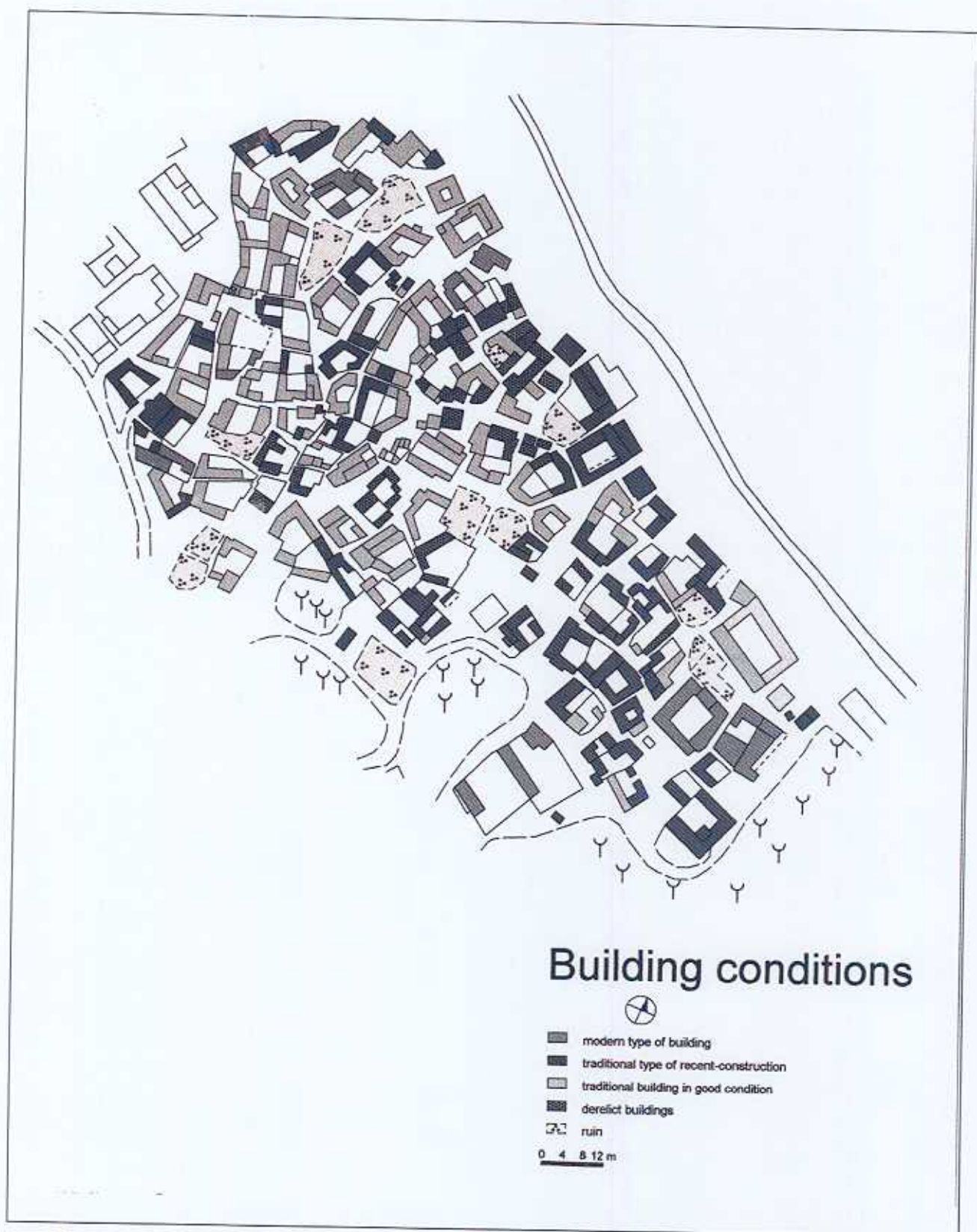


FIGURE 8. Plan of Tīwī/Ar Ramīlah, showing building conditions.



FIGURE 9a. Tīwī, houses II-VI. Ground floor plan.

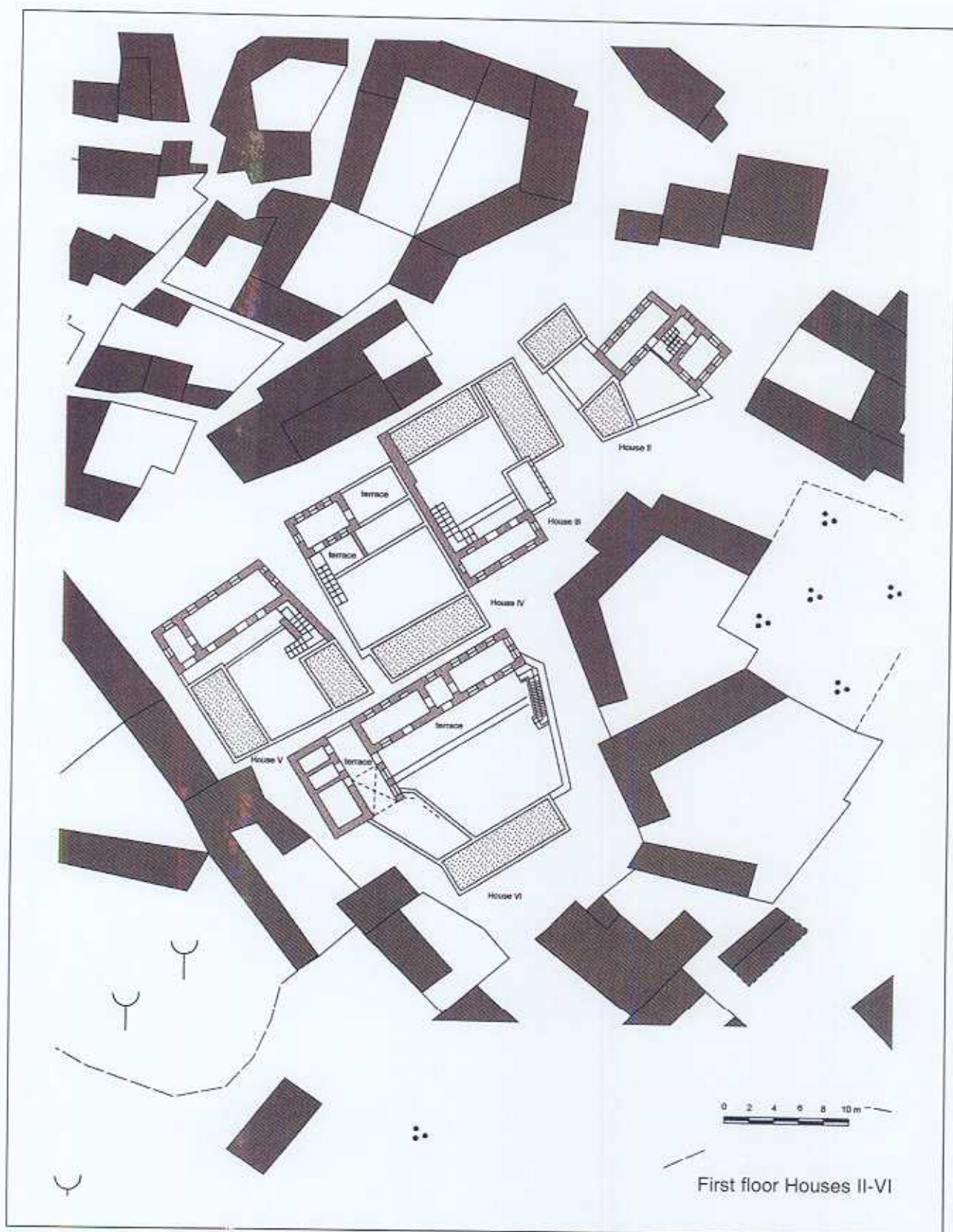


FIGURE 9b. Tlwi, houses II-VI. First floor plan.



PLATE 18. Țîwi, house III, reception room.



PLATE 19. Țîwi, old *sūq*. View from SE. The shop in the foreground was active until 1995.



PLATE 20. Īwī, old sūq. View from E.



PLATE 21. Īwī, shops on the main road.

sists mainly of empty booths. Some other branches like a bank, a sale of meat and of vegetables, laundries, barber, tea rooms, restaurants, are also present. A cluster of shops and services is located around the very square which has been mentioned above as the traditional centre of Ar Raḥah. Not only in terms of space has the traditional *sūq* disappeared. In local trade, local products hardly play a significant part any more. The marketing of dates has been reorganized, so that producers sell more or less directly to Muscat (according to Sa'īd bin Sa'īd as Saḥī). Fish is only caught for the current need or exported on ice to Sur, but no longer dried or salted. As a contrast, Ṭīwī continues to function as a centre from which the surrounding area is supplied with goods or with durable food. This position is, however, restricted mainly to the wadi, and no longer extends to the other side of the mountains.

Despite considerable improvements in the infrastructure of the traditional town centre⁵, the depopulation of Ar Ramlah can be dated into the same period of the 1990s. A new residential quarter has been laid out west of the through road, and

is being built up at quick pace. New houses occupy plots of c. 20 x 20 m or more, arranged in a slightly irregular grid pattern (fig. 5, pl. 22). It is important to note that the external walls are hardly ever contiguous with each other but always leave spaces in between which can be used as walk- or driveways respectively. Development of the new quarter is organized along axes roughly perpendicular to the main road. Clearly, preferences in the location of new houses can be recognized on the plan. In general, growth proceeds from the main road and the commercial centre in a north-westerly direction, so that those plots which are distant from the old centre and up the slope are used last. Apparently, locations for residence are chosen in relation to other inhabited parts of the town, while accessibility (by car) seems to be the dominant factor for the location of commercial buildings.

The built area has increased over proportion in comparison to the number of houses. A glance at the map reveals the size of the single plots, which approximates 7.7 ares in the new settlement area, compared to an average 4 in Ar Ramlah, 5.4 in Ar



PLATE 22. Ṭīwī, houses in the new residential area. View from SE.

Raf'ah. While the number of houses in the newly built areas appears not terribly high (158) in comparison with the old cores (139 houses), the area covered is nearly twice as large (10.7 hectares to 6.0 hectares).

As a consequence, the traditional centre of the town has turned into a vacuum. While spatial organization on Ar Raf'ah seems to have undergone comparatively little change, the *suq* in Ar Ramlah is lying waste. It is perceived as such by the population of Tiwi: Since the sale of fresh fish takes place in the shed at the Eastern tip of Ar Ramlah, several men walk through the old *sūq* area every morning on their way to the fish auction.

New institutions have found their place in Tiwi in the past few years: Public administration (the office of the *na'ib wālī*), a health centre⁷, and the school (primary and secondary)⁸ underline Tiwi's position as a place of central functions. Although the town clearly ranks behind Šūr as the provincial centre, and also behind Quriyyāt as the next larger town in the other direction, these are distant enough to make sure that inhabitants of minor settlements in the region will turn to Tiwi. The question is whether modern institutions suffice to attract enough potential to Tiwi to keep the town alive. In other words: will Tiwi survive without functioning as commercial outlet of the wadi? Probably, after the decline of its agricultural importance, the tourist potential of Wādī Tiwi will have a decisive say in the future development of the town. The impressive and still largely undisturbed environment of the wadi could attract foreign and local tourists alike even in a country with many other places of natural beauty. This potential can be expected to rise in importance once the accessibility of Tiwi is facilitated by the building of an asphalt road between Quriyyāt and Šūr. At the same time, unlimited access to the wadi would probably contribute to the degradation of its natural resources. Although it is far from clear what effect road construction will have on the town, it seems that another phase of change in the structural history of Tiwi is imminent.

NOTES

¹ Editorial comment: An oral tradition exists in Tiwi that the large southern Islamic cemetery contains graves of the Turks, 'quboor al Atraak'. This tradition would seem to preserve the historical memory of invasions of Turks (see further for possible origins of the Turks in Qalhāt in *Arabian History, Context and Chronicles*, this volume.)

² 1:100,000, Joint Stock Company SK-IMPEX, Moscow, Russia. - The 1:100,000 maps available from the National Survey Authority of Oman have only 100-m altitude lines.

³ Trimble Pathfinder, Sunnyvale, CA, USA.

⁴ A GPS-linked binocular with built-in rangefinder, compass and inclinometer functions (Leica Geosystems AG, Heerbrugg, Switzerland).

⁵ URL: <http://edcdaac.usgs.gov/aster/asterdataprod.html>.

⁶ In 1995, centralized water supply from a water plant at Wādī ash Shāb was installed; 1996 all houses in Tiwi received electric current; in 2002, electricity was brought to the villages of Wādī Tiwi (information by Sa'īd bin Sa'īd as Salṭī).

⁷ The health centre north-west of the old town has replaced the old hospital building in the cemetery area south of Ar Ramlah, which had been erected at private initiative in the 1970s (according to Aḥmad bin Mubārak al Muqaymī).

⁸ The first Government school at Tiwi, founded in 1974, was housed in the residence of the Paramount Shaykh of the Banī Muqaym, Sheikh Khalīfa bin Ḥamad bin 'Īsa. The existing boys' and girls' school north-west of the old town was built in 1986.

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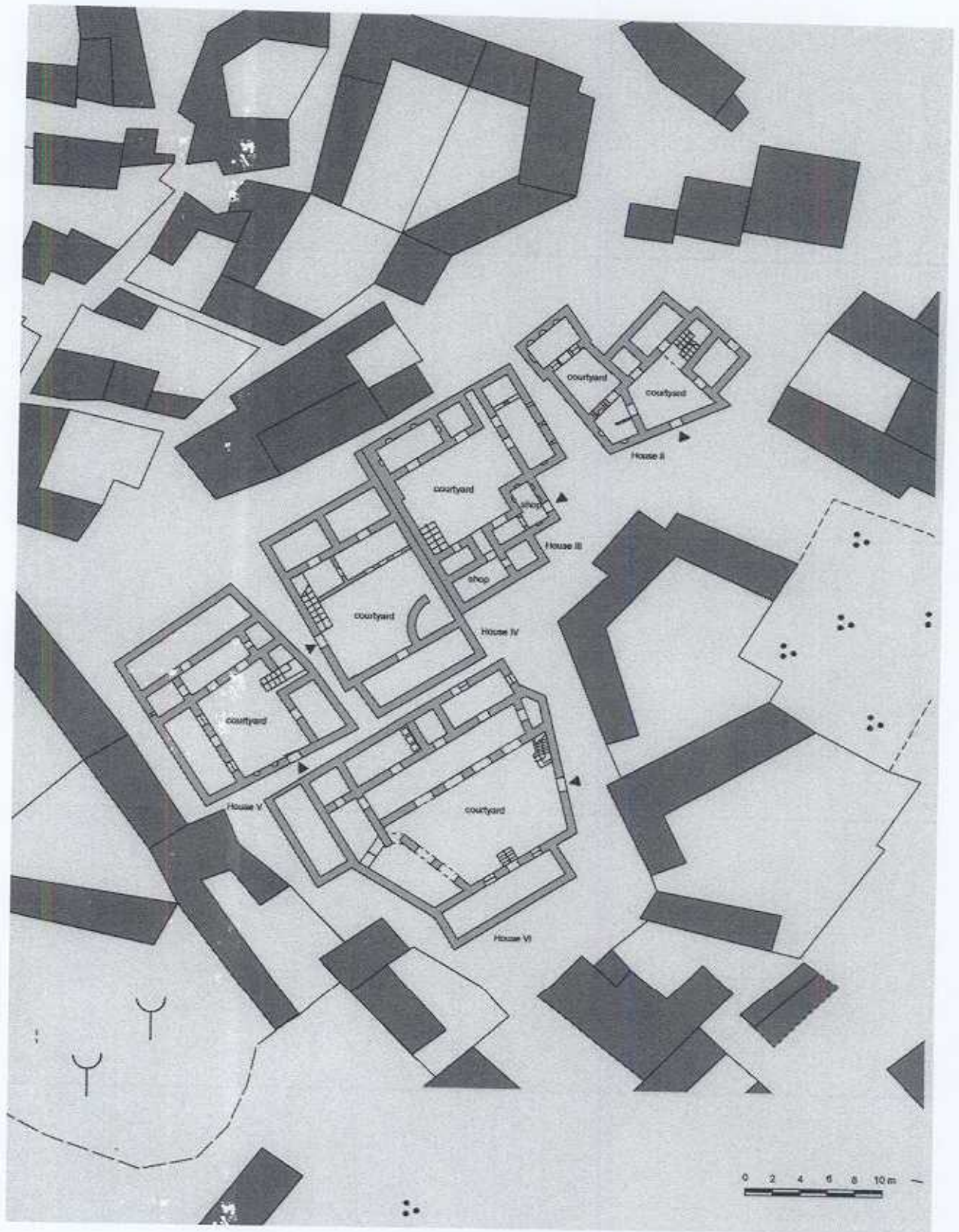
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