

# WADI ZIQLAB PROJECT 1987 A PRELIMINARY REPORT

by

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## Introduction

The Wadi Ziqlab Project began in 1981 as a regional survey to investigate changes in rural land use and identify factors affecting the choice of site locations by their ancient users and inhabitants.<sup>1</sup>

Problems necessarily associated with surface survey were the focus of further research in the Wadi Ziqlab drainage basin (Fig. 1) in 1986 and 1987. Among the difficulties encountered when surface survey is the only tool for uncovering patterns of ancient settlement and land use are visibility of sites, dating sites that provide few "diagnostic" artifacts, determining site functions, accounting for changes in the region's physical environment, and reconstructing economic changes.

## Components of the 1987 Research

Work during 1987 had five major components. These were geomorphological survey, phytogeographical and palaeobotanical survey, soundings at three "tower" sites (WZ8, WZ9, and WZ116) and a mill (WZ204), and ethnoarchaeology and soundings at a campsite (WZ200). Work at the last site subsequently developed into investigation of early components lying below the modern one.

## GEOMORPHOLOGICAL RESEARCH IN WADI ZIQLAB

Geomorphological research during the 1987 season had three main objectives. The first was to establish a Quaternary stratigraphic history for interpreting climatic change and assessing the potential for site burial and preservation in Wadi Ziqlab's drainage basin.

The second was to study the distribution of soil types and their associations with plant communities. Finally, one goal was to note chert sources that may have been used in lithic manufacture.

Subdividing the drainage basin into three sections, upper Wadi Ziqlab, the wadi mouth, and the adjacent Jordan Valley, facilitated study of the wadi's Quaternary history. This was because of differences in the stratigraphy and difficulties in correlation between each section (Fig. 2).

## Quaternary History

*Upper Wadi Ziqlab:* Here, one section over 7m thick exposes nearly 3m of a rounded cobble gravel overlain by up to 4m of poorly sorted gravelly silt loam (Fig. 3). This indicates that a period of alluviation and aggradation of the wadi bottom was followed by colluviation.

Excavations at site WZ200 (below) indicate that the colluvial phase began during or sometime before the classic Kebaran and ended before late Neolithic graves on the site were dug from the present colluvial surface. Colluviation is often associated with arid climates, when hillside soils are washed downslope due to the lack of stabilizing vegetation, but the clay-rich soil containing Kebaran artifacts could be formed under moister conditions than those observable today. Our soil samples, once analysed, should help clarify this issue.

The preceding alluvial phase, probably late Pleistocene in age, is characteristic of more humid periods when more water is available to transport gravels. Archaeological sites may be buried deeply in the 4m

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1. Banning and Fawcett 1983.

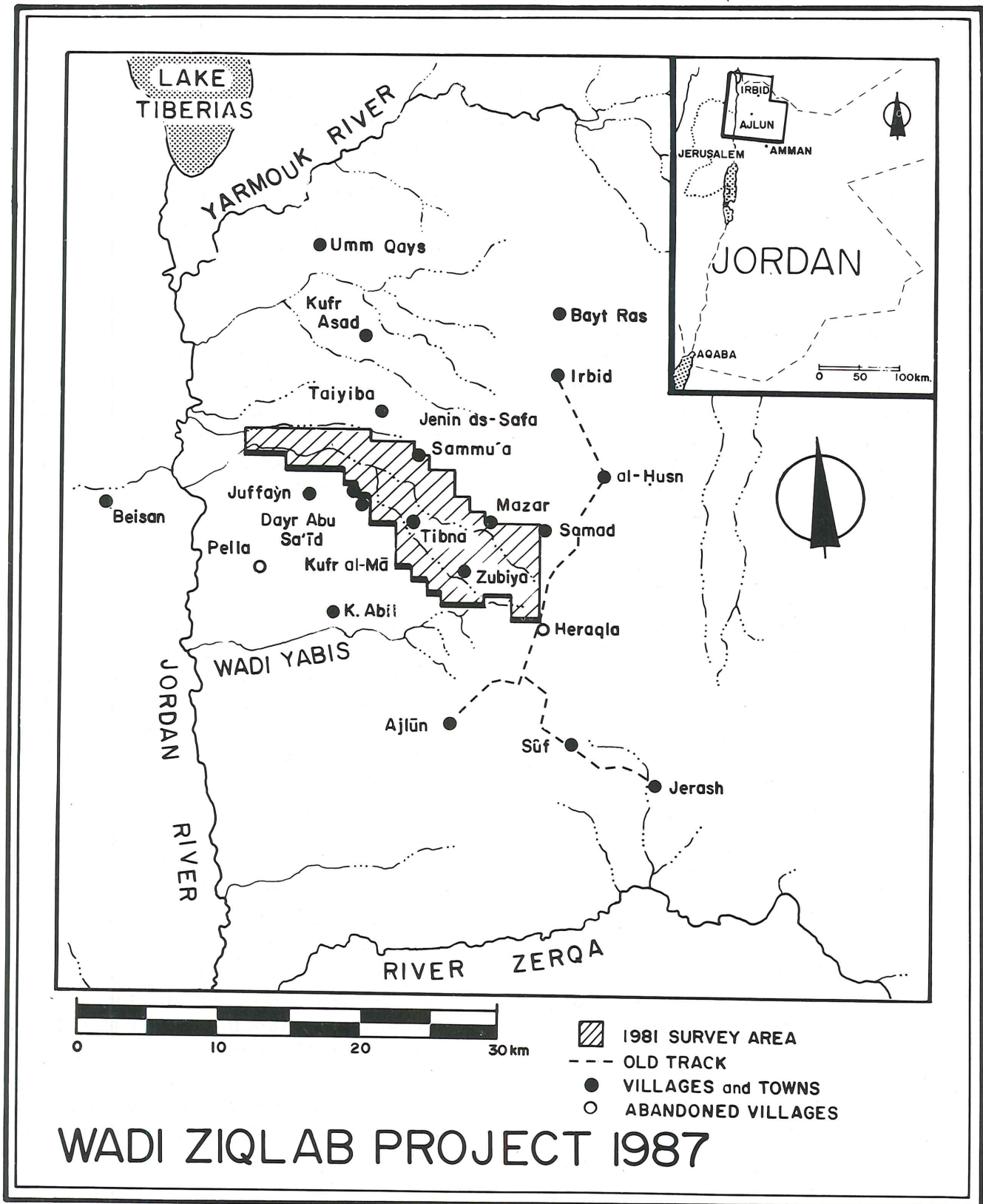


Fig. 1. Location of Tibna, just south of sites sounded during the 1987 season of the Wadi Ziqlab Project.

# WADI ZIQLAB PROJECT 1987

## Stratigraphic Reconstructions for Wadi Ziqlab Area

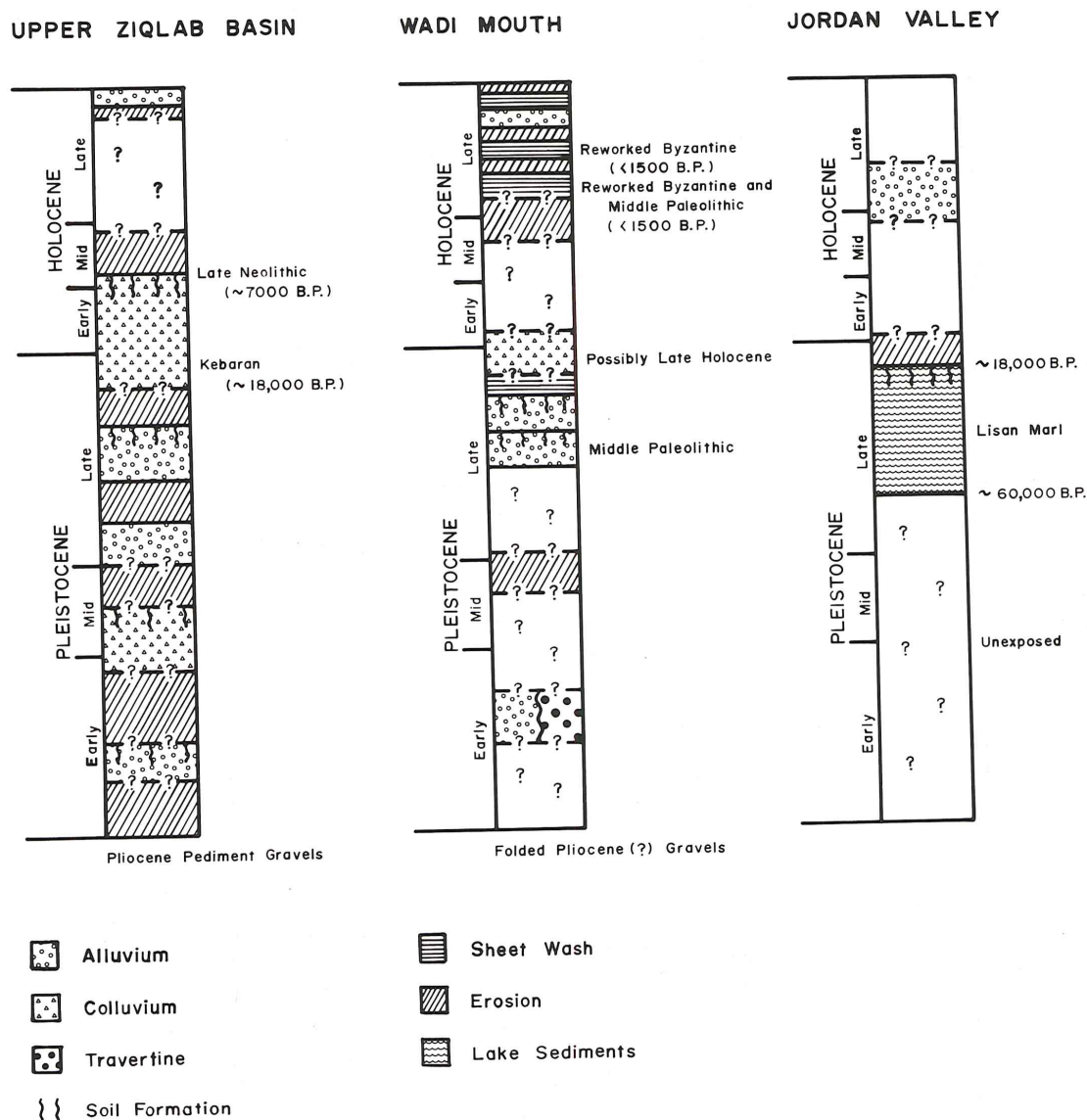


Fig. 2. Stratigraphic reconstructions of three portions of the Wadi Ziqlab area. Dashed contacts with question marks indicate uncertain age of erosional or depositional phase. Relative ages are accurate. Some erosional phases cut only alluvium while others cut bedrock.



# WADI ZIQLAB PROJECT 1987

## Exposed Stratigraphic Profile East of WZ 200

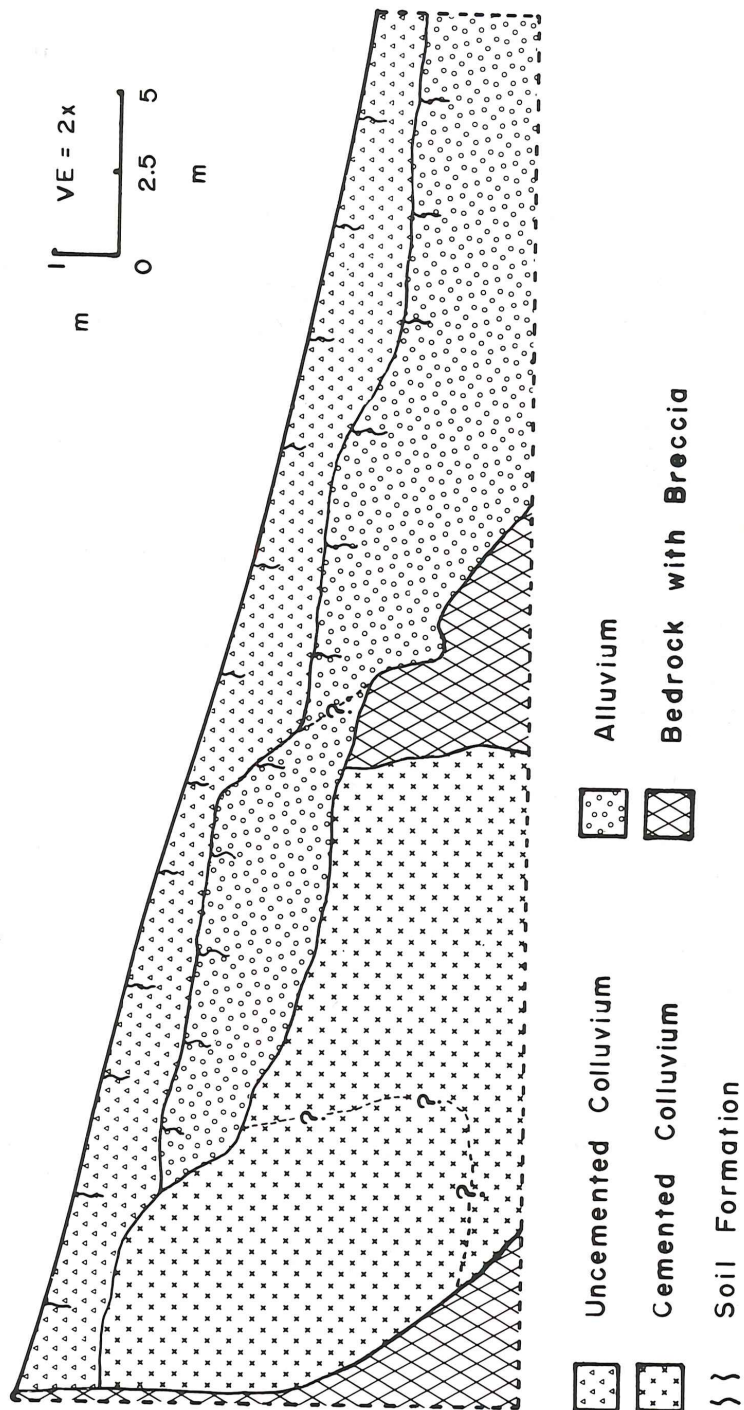


Fig. 3. Stratigraphy exposed in the upper Wadi Ziqlab, just east of WZ200, Ṭabaqat el-Būma.



of colluvium as evidenced at WZ200 where Kebaran artifacts occur over 2m below the modern surface.

Older deposits in the upper Ziqlab basin are exposed beneath the alluvium and in topographically higher positions. These include well cemented colluvial and alluvial deposits that reflect a complex climatic history during the Quaternary.

*The Wadi Mouth:* At the mouth of Ziqlab and adjacent wadis, the exposed stratigraphic record is quite different. In the Ziqlab drainage over 3m of silty slopewash deposits contain Byzantine-Islamic pottery. This rapid deposition during the late Holocene may have an anthropogenic origin, such as overgrazing. Three km south of Wadi Ziqlab a 12m section of alluvial gravel and sand shows, at its base, abundant Middle Palaeolithic artifacts that do not appear to be transported. This implies that a major alluvial phase during the Late Pleistocene may have been associated with a moister climate.

*The Jordan Valley:* Here, limited downcutting makes stratigraphic reconstruction difficult. A possible remnant of the Lisan Marl was observed 1km from the Wadi mouth, indicating that the large late Pleistocene lake which occupied the Jordan Valley between 60,000 and 18,000 B.P. extended close to Wadi Ziqlab. This is consistent with evidence from upper Wadi Ziqlab for a late Pleistocene humid phase. Inset into the remnant is a deposit of channel gravels and sands, 3m in thickness.

*Soil Distributions:* Each locality in the project's palaeoethnobotanical sample provided data on soil texture, colour, and pH. Slope gradient, elevation, and aspect of each location were also recorded. Leached clay-rich soils of the Terra Rossa type occur on the flat pediment surface above the wadi slopes and reflect a long period of soil formation. On the upper hillslopes of wadis these Terra Rossa soils are reworked and share many of the same

characteristics of the primary Terra Rossas, although they tend to be slightly more gravelly and less clay-rich. Further downslope the soils change dramatically to much siltier, unleached Rendzinas which reflect the constant addition of material from the surrounding calcium-rich limestones. These results are comparable with those of Fisher *et al.*<sup>2</sup>

*Flint Resources:* Although time did not permit a detailed survey, some general comments on flint distributions are possible. The Ajlun Series limestones in the upper watershed of Wadi Ziqlab are largely devoid of chert. In contrast, the Balqa Series chalks outcropping in the lower watershed contain abundant chert nodules and chert horizons. In addition, an escarpment bordering the Jordan Valley exhibits a conglomerate with abundant chert cobbles of excellent flaking quality.

(JJF)

#### PHYTOGEOGRAPHICAL SURVEY AND PALAEOETHNOBOTANY

Our botanical research has three major components: collection and analysis of archaeological plant remains and pollen spectra, accumulation of a comparative collection of seeds of modern plants, and characterization of modern land use in terms of the composition of plant communities. The second and third areas of study are to aid in the identification of plant remains and to help us understand past land uses through archaeological plant material.

More than 30 locations have provided samples for flotation (sites WZ8, WZ9 and WZ200). Pollen samples from various locations both in archaeological contexts and from wet sediments and Pella and 'Ayūn Ziqlāb will produce information concerning the history of deforestation in the 'Ajlun hills during the last 2000 years. These are complemented by duplicate soil samples for phytolith analysis.

2. Fisher *et al.* 1966.

The phytogeographical survey has now documented more than 650 plant species in the Ziqlab basin and we have begun to quantify the occurrence of species within different land use types. The characterization of plant associations in agricultural fields, fallow, maquis and closed forest areas will provide useful analogs with which to interpret past agricultural activities and anthropogenic plant communities through surviving plant remains. Approximately 200 individual observations in more than 40 field, fallow and forest areas provided data for analysis. These data are now available for statistical manipulation, and permit us to relate specific vegetation types to land use areas. Certain weeds, for example, show significant associations with particular crop fields; others are most frequently associated with pasture or forest. For example, of more than 100 weed taxa documented in the survey of grain fields, 35 species in bread wheat fields never appeared in our samples from barley fields. This and many other examples have numerous implications for interpreting archaeological plant assemblages. Most importantly, our results will permit recognition, in the composition of plant taxa in an archaeological sample or pollen record, of a particular land use type's "signature". This allows us to make more specific inferences about past land uses and will improve our understanding of the changing interactions between people and their local environments in antiquity.

(SGM and JMcC)

#### SOUNDINGS AT WZ200, ṬABAQAT EL-BUMA

Ṭabaqat el-Būma is the name we propose for a newly discovered site at the confluence of Wādī 'Ain Sirīn (Wādī Inbah) and Wādī 'Ain Zūbiya, the two major tributaries of Wadi Ziqlab. The site, on a low colluvial terrace along the road to Tibna,<sup>3</sup> has served for at least two years as

a summer camp by a "small farmer" of sheep and goats. The presence of shallow drainage trenches around abandoned tent areas on the site suggests that it has also been used in the winter.

In 1987, we undertook to map the modern camp at WZ200 and to test for earlier pastoral occupation below the modern dung horizon. During mapping a few lithics that we discovered suggested the possibility of a much earlier occupation of this terrace. Discovery of lithics in larger quantities as excavation of Area A progressed led us to open Area B, farther upslope.

Area A was, initially, a narrow test trench that yielded mixed modern and ancient material. Subsequent expansion of excavations produced a stone-lined grave. Beneath the grave was sterile sub-soil. Discovery of the grave made it apparent that mixing of the Kebaran artifacts with much later material was the result of grave-cutting and tomb construction.

Area B was a deep sounding, 1.25m x 1.25m in area. There we again encountered mixed material and a possible disturbed grave with pottery fragments similar to those in Area A. A carbonate layer appeared one metre below the surface, and continued to a depth of 1.6m. Below, a pure Kebaran locus was excavated to a depth of 2m from the surface. When excavations came to a close, Area B was still producing lithics and an increasing number of animal bones, although the bones were still very fragmentary and few in number.

#### The Kebaran Material

Table 1 provides a breakdown of the material recovered from each of the excavation areas. In Area A the Late Neolithic admixture makes it difficult to determine whether some of the tools or cores are Kebaran or Late Neolithic. Clearly the bi-truncated, backed, and denticulated blades that exhibit sickle sheen

3. Or "Tubna" in the local dialect.



**Table 1:** Frequency of artifacts by class in Areas A and B at site WZ200, Ṭabaqat el-Būma.

Area A		Area B	
<i>Artifact Class</i>	<i>N</i>	<i>Artifact Class</i>	<i>N</i>
Bladelet Cores	5	Bladelet Cores	19
Flake Cores	4	Burin on a Break	1
Core Scraper - denticulated	1	Scraper/Burin Combination	1
Flake Scrapers	4	Notch/Denticulate	2
Endscraper on Blade	1	Utilized Blade	2
Burin on a Break	1	Kebara Points	13
Burin Spall	1	Round Base Backed Bladelets	4
Notch/Denticulate	7	Bitruncated Pieces	2
Utilized Blade	1	Backed Bladelet Fragments	17
Truncation - oblique	3		
Broken Truncation/Microburin	3		
Kebara Points	15		
Backed Bladelet Fragments	21		
Sickle Elements- Denticulated	5		
<b>Total</b>	<b>71</b>	<b>Total</b>	<b>43</b>

are Late Neolithic. Similarly a large denticulated scraper and a large flake core may be Late Neolithic. The small flake scrapers would certainly fall within the range of material reported from Kebaran sites,<sup>4</sup> but flake scrapers were not recovered from the undisturbed Kebaran deposit in Area B. The backed bladelets, truncations and bladelet cores as well as the bladelets themselves are the only material in Area A that is definitely Kebaran.

In Area B, 43 retouched pieces, including a large number of pyramidal single platform bladelet cores (n=19) on wadi cobbles, were recovered from one cubic metre of undisturbed Kebaran deposit. A very large quantity of narrow unretouched bladelets and knapping debris formed the bulk of the assemblage. Retouched tools are dominated by broken Kebara points,<sup>5</sup> bases and miscellaneous backed bladelet fragments (tips and mid-sections). Two bi-truncated pieces were also found. Four bases exhibited a rounded truncation rather than the sharp oblique truncation (the intersection of the back and the

truncation forms an obtuse angle) of the Kebara points. The backed bladelets in general exhibited very good normal abrupt retouch characteristic of classic non-geometric Kebaran.<sup>6</sup> The raw material is very fine grained nodular flint which can be found in the nearby wadi channel. A small portion of the lithic material showed signs of burning (blackening and pot-lid fractures).

Although the assemblages from these two Areas are small and, in the case of Area A, mixed, there are some interesting differences between the two Areas. In Area A a large percentage of the raw material is grey-brown in colour while in Area B the bulk of the debitage is of light brown flint. The large number of cores in Area B suggests that it was a work area for bladelet production. Partially backed pieces or backed bladelets broken in manufacture, however, are virtually absent, indicating that the bladelets were not worked to any large degree in the immediate area. Area A has a much wider variety of tools, fewer cores and much less debite-

4. Besancon, Copeland and Hours 1975.

5. *Ibid.*6. *Ibid.*, Bar Yosef 1975.



age than Area B. In addition, a small number of the backed pieces from Area A exhibit inverse retouch which is absent in Area B, and rounded backed bladelet bases which are found in Area B are absent from Area A. Even given the problems of Late Neolithic admixture these limited data do suggest that the site preserves considerable variation in assemblage content from one Area to another that may be related to differences in tasks carried out or to different occupations of the site.

Our limited excavations at site WZ 200 have demonstrated the presence of a rich and spatially varied Kebaran occupation in undisturbed context. The topography of the site suggests the possibility of undisturbed deposit over an area much greater than 20 square metres. Tool typology and attributes of the backed bladelets indicate that the assemblage is classical Non-geometric Kebaran which may date between 20,000 and 16,000 B.P.<sup>7</sup>

(PJS)

### The Late Neolithic Material

The Area A tomb was cut into the earth at the west margin of a bedrock outcrop and lined on the north and south sides by stone slabs that supported capstones (Pl. VI, 1 and 2). The west wall consisted of a single massive stone set on end, much like a modern headstone. The floor of the grave consisted of sub-soil. Less substantial and much smaller stone-lined graves, for flexed inhumations, occurred at Byblos during the *Néolithique Récent*<sup>8</sup> and at Batashi, where a burial "marked with stones... included an upright stone standing on its narrow edge."<sup>9</sup>

The grave was excavated into the Kebaran deposits and its walls constructed. Following internment of one individual with grave goods, it was capped without

interior fill; the fill beneath the covering slabs apparently filtered in through the spaces between the stones over the course of time. The fill was almost pebble-free and contained relatively little cultural material. The grave goods included a cluster of broken pottery and, at a depth of 1.5 m, a stone bowl or mortar, two pottery bowls, two pottery jars, a basalt grinding slab, and a small pierced stone disc (Fig. 4).

Human remains in the grave were very fragmentary and consisted of a few teeth as well as parts of some longbones. These require removal of calcide encrustation before attempting reconstruction for analysis. Until then it is possible only to attribute the bones to an adult. The size of the grave and distribution of bones suggests, however, that the burial may have been extended, unlike the Byblos examples, with the head near the cluster of pots.

*Pottery and Objects:* The vessels, particularly from the Area A grave (Fig. 4), have general parallels for form in a number of Late Neolithic sites in Palestine and Lebanon. In the Pottery Neolithic B (PNB) of Jericho are similar, but shorter, convex jar necks or "bow rims" and deep bowls with slightly carinated profiles.<sup>10</sup> "Bow-rim" jar necks and somewhat similar deep bowls are typical of Late Neolithic contexts at Batashi<sup>11</sup> and Wadi Rabah.<sup>12</sup> There are more distant parallels with the "ballons" at Byblos (*Néolithique Moyen*).<sup>13</sup> Tell esh-Shuna North and Tell Abu Habil in the northern and central Jordan Valley also provide some parallels.<sup>14</sup> Some formal characteristics, such as concave bases, occur rarely at other sites.<sup>15</sup> Others, especially the shallow, lamp-like bowls (Fig. 4:10-11) and the small, cylindrical "strap" handles (Fig. 4:6,16) appear to be idiosyncratic. Some sherds and vessels exhibit red slip, especially on the rim. Most of the

7. Bar Yosef 1981.

8. Dunand 1973, p. 136.

9. Kaplan 1955.

10. Kenyon and Holland 1983, Figs. 76.8, 23, 25.

11. Kaplan 1958a, Fig. 10.13.

12. Kaplan 1958b, Figs. 5.8-9, 10.

13. Dunand 1973, p. 64, Figs. 65, 67.

14. Moore 1973, p. 59; de Contenson 1960, p. 20, 35.

15. E.g. Kaplan 1958b, p. 158, Fig. 5.10.

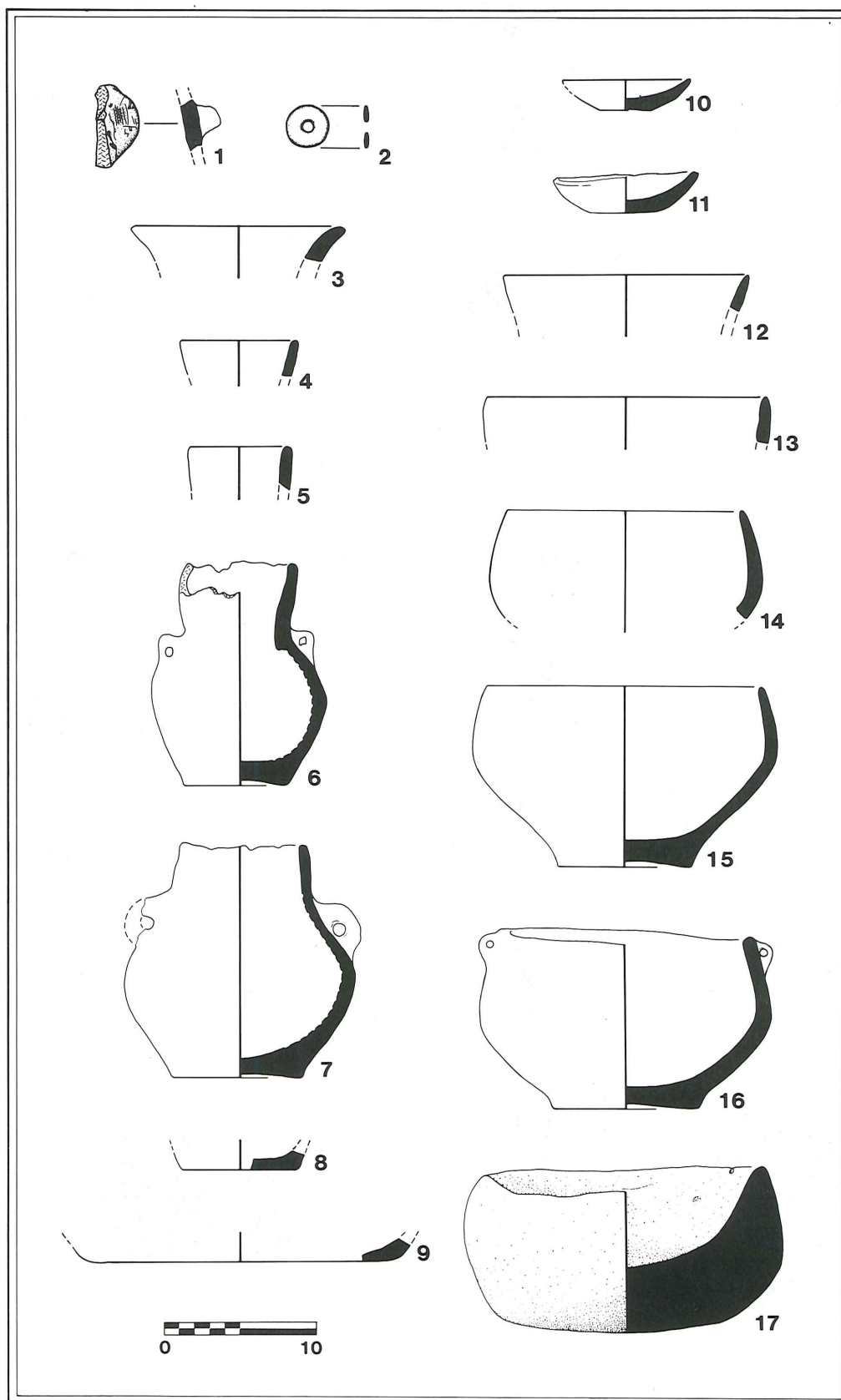


Fig. 4. Pottery and objects from WZ200, Tabaqat el-Būma: (1) ledge handle A.46.1; (2) pierced disc A.72.3; (3-5) jar rims A.72.10, A.103.1, A.46.2; (6-7) jars A.72.6, A. 72.4; (8-9) bases B.15.1, A.67.2; (10-11) small dishes A.72.22, A.72.8; (12-13) rims A.45.3, A.66.1; (14-16) bowls A.72.5, A.72.1, A.72.3; (17) mortar A.72-x. Scale is 10 cm.

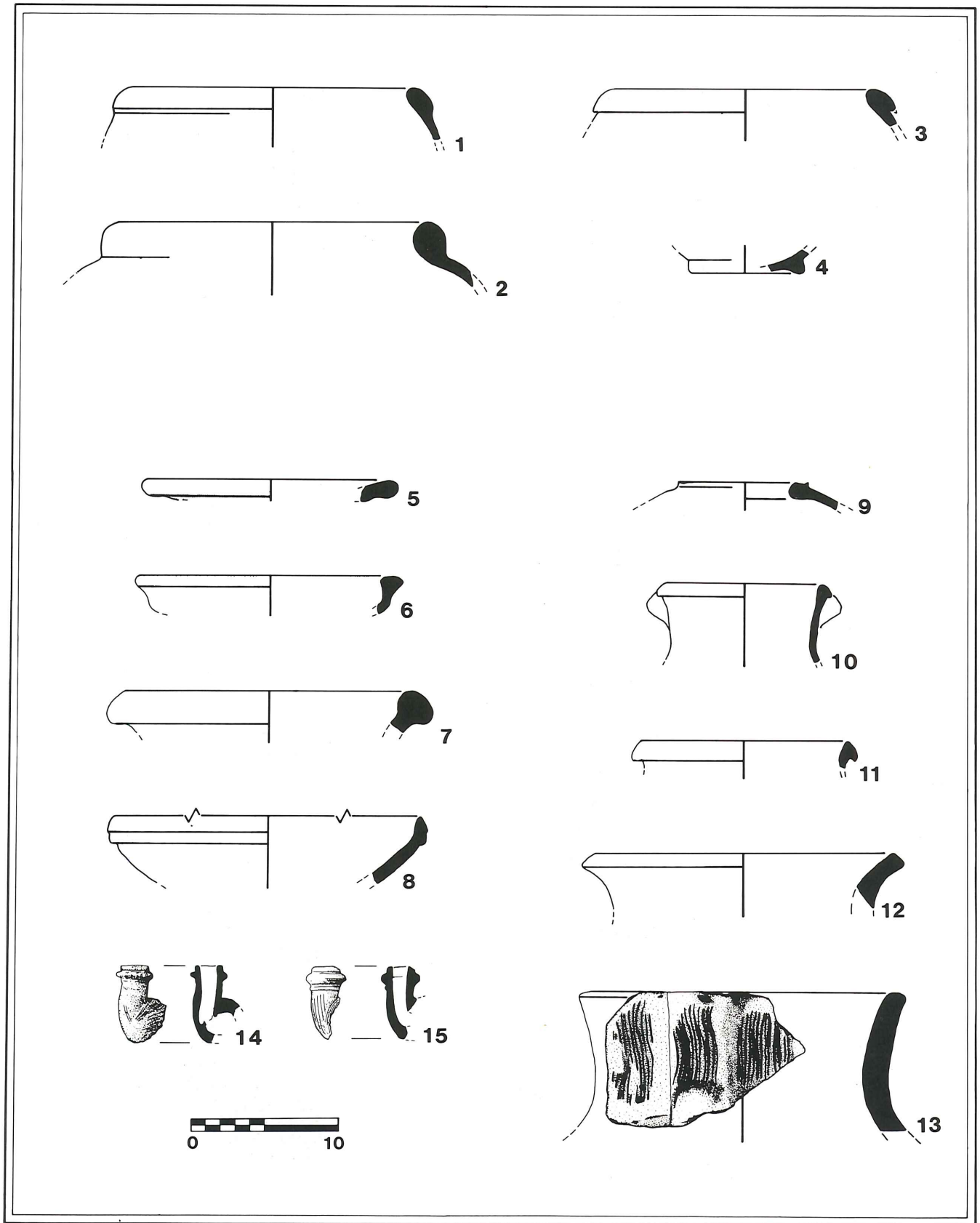


Fig. 5. Objects and pottery from site WZ9, Umm eš-Šuwwān and WZ8, Ras el-Qabūb: 1-4) WZ9 rims B.10.1, B.9.1, B.11.1, and base B.12.1; (5-12) WZ8 rims B.27.2, B.26.2, B.27.1, B.29.1, B.15.2, A.4.1, A.3.2 and B.2.1; and (14-15) WZ8 pipes C.3.1. and B.12.8. Scale is 10 cm.



pottery, however, is plain ware, and only one appears to have, in our admittedly small sample, any incised decoration. In general, the pottery falls into a class distributed across the Esdraelon Plain and northern Jordan Valley, corresponding roughly to Moore's phase 2 of the Late Neolithic, or the late fifth millennium b.c.<sup>16</sup>

Coarsely denticulated blades, all with sheen, a limestone mortar, notched blades, and a pierced stone disc, are all broadly typical of the late Neolithic.<sup>17</sup> Some scrapers and cores among the lithics may also be Neolithic.

(EBB, RRD and PJS)

### INVESTIGATION OF THREE "TOWERS" NEAR TIBNA

One enigmatic type of site that archaeological surveys in Jordan frequently encounter is somewhat loosely described in the literature as a "tower". The dates and functions of these isolated structures are often far from certain when surface evidence is all that is available.

Two of the "towers" recorded by the 1981 survey of Wadi Ziqlab (sites WZ8 and WZ9) were the subject of soundings in 1987, to obtain better evidence for their date and, if possible, for their functions. During work on these sites, which are close neighbours, a third "tower" (WZ116) became apparent roughly midway between them. Limited excavations took place at all three sites.

#### Site WZ9, Umm eṣ-Ṣuwwān

Site WZ9 is a circular "tower" of massive chert and limestone blocks. A modern field wall, which probably incorporates blocks robbed from the ancient structure, bisects the site. The 1981 survey could not provide an unambiguous date for the structure, due to the extremely small sample size, but suggested a possible Iron

Age date. The site has a commanding view of the country to the north and west of Tibna, and could conceivably have had a military function. Nonetheless, there was no direct evidence for the function of the site and, without excavation, it was impossible to rule out the possibility that it was a habitation site, farm or livestock enclosure.

The plow zone of a garden within the structure contained artifacts dating to Roman times and later. Among these were a bronze arrow point and the rim of a bronze vessel that may belong to the Mamluk period.

The deepest deposits inside the structure produced a large fragment of a limestone mortar and 128 sherds of Iron Age pottery, mainly in poor condition. These deposits overlay highly irregular bedrock, upon which the stone structure was built. The deposits contained no evidence of living floors, of features, or even of bedrock that was flat enough to provide a usable living or working surface. The top of this locus may be the original collapse surface of the structure, however, as it exhibits many large rocks that seal the deposit of Iron Age pottery. Many of the sherds appear to belong to large jars, but most are merely body sherds of limited typological value.

A sounding outside the structure was almost devoid of artifacts, but a low "bench" wall, abutting the exterior of the "tower" itself, can have been built no earlier than Roman times, as evidenced by pottery found beneath the stones of this wall.

*Lithics from WZ9:* Excavation of the stone tower produced considerable quantities of flakes and a number of chunks of flint from which one, two or three flakes had been removed. Although many of the flakes exhibit striking platforms and bulbs of percussion it is quite probable that the majority were not produced by flint knapping *per se*, but by a number of other

16. Moore 1973.

17. Dunand 1973, p. 102, 163-4, Figs. 70, 97, 99;

Kenyon and Holland 1983, p. 547-9, Fig. 229.4; Moore 1973, p. 46-7; Stekelis 1951.

cultural activities.

As its name suggests, the area around *Umm eṣ-Ṣuwwān* ("Mother of Flints") has a dense ground cover of poor quality tabular flint, while the tower itself is constructed from flint blocks with areas of fill composed almost totally of angular flint chunks. Given the very great quantity of flint it is not surprising that a relatively small number of pieces should have the same morphology as material produced by flint knapping. Many of the blocks used in construction have bifacially battered corners which might simulate edge damage if, during construction, flakes were detached from the blocks. Examination of the blocks did not reveal any systematic shaping by knapping, but it is likely that dropping and positioning of rocks forced off some flakes. Tossing flint onto areas of flint fill does, as we observed, result in the creation of large flakes. Further movement against other rocks during the plowing of the area within the tower and trampling by goats and sheep would be expected to produce edge damage in the form of notching and denticulation, often through bifacial or alternate flaking. A large number of the flakes from the tower do exhibit this type of damage, yet purposeful retouch to form scrapers or other shaped tools is absent. Given the large number of factors that could have combined to create pseudo-flakes and pseudo-tools it is most reasonable to conclude that the vast majority of the pieces recovered from site WZ9 are not the product of flint knapping. In future, examination of non-site areas of flint concentration may provide a useful guide for the separation of lithic debitage produced by cultural and non-cultural factors. This type of study may be especially important when dealing with Bronze or Iron Age industries where non-formalized tools (especially notches and denticulates) may be an important part of the assemblage.

(PJS)

#### Site WZ116

This site, partially obscured by a

modern stone pile, appears very similar in form to site WZ9 except that it does not form a full circle. We were unable to determine whether this was an original design feature or was due to robbing of stones from the enclosure wall. The lack of easy access and absence of more recent nearby stone structures makes such robbing unlikely, however.

A small sounding against the interior face of the western wall segment, one of the better preserved fragments of the structure, very quickly hit bedrock. Much as in site WZ9, it was overlain by a deposit containing Iron Age pottery.

#### Site WZ8, Ras el-Qabūb

A nearly rectangular stone structure that occupies the top of the hill immediately south of the modern village of Tibna was also the subject of soundings in the 1987 season of excavations. The walls of the structure have small, undressed stones set in a lime mortar that suggests a mediaeval or Ottoman date for its construction. But the total lack of surface pottery in, or in the immediate vicinity of, this structure made excavation necessary to determine the building's date.

The structure at site WZ8 proved a surprise. It soon became apparent that excavation inside the structure was cutting through a ceiling or upper floor into a barrel vault below (Fig. 6). Loose debris apparently had filled it from above, through a large hole in the vault. The fill had been deposited over a very short period of time, exhibiting no significant variation from top to bottom. Throughout, it contained late Ottoman artifacts and pottery, including several pipes or pipe fragments (Fig. 5). The doorway had been blocked prior to its deposition. The ceiling of the barrel vault was covered with a lime plaster decorated with charcoal graffiti. The building's exterior walls originally had a facing of cut limestone, most of which had been robbed, probably for reuse in nearby Tibna.

#### Summary of the "Tower" Investigations

Determination of the dates for the



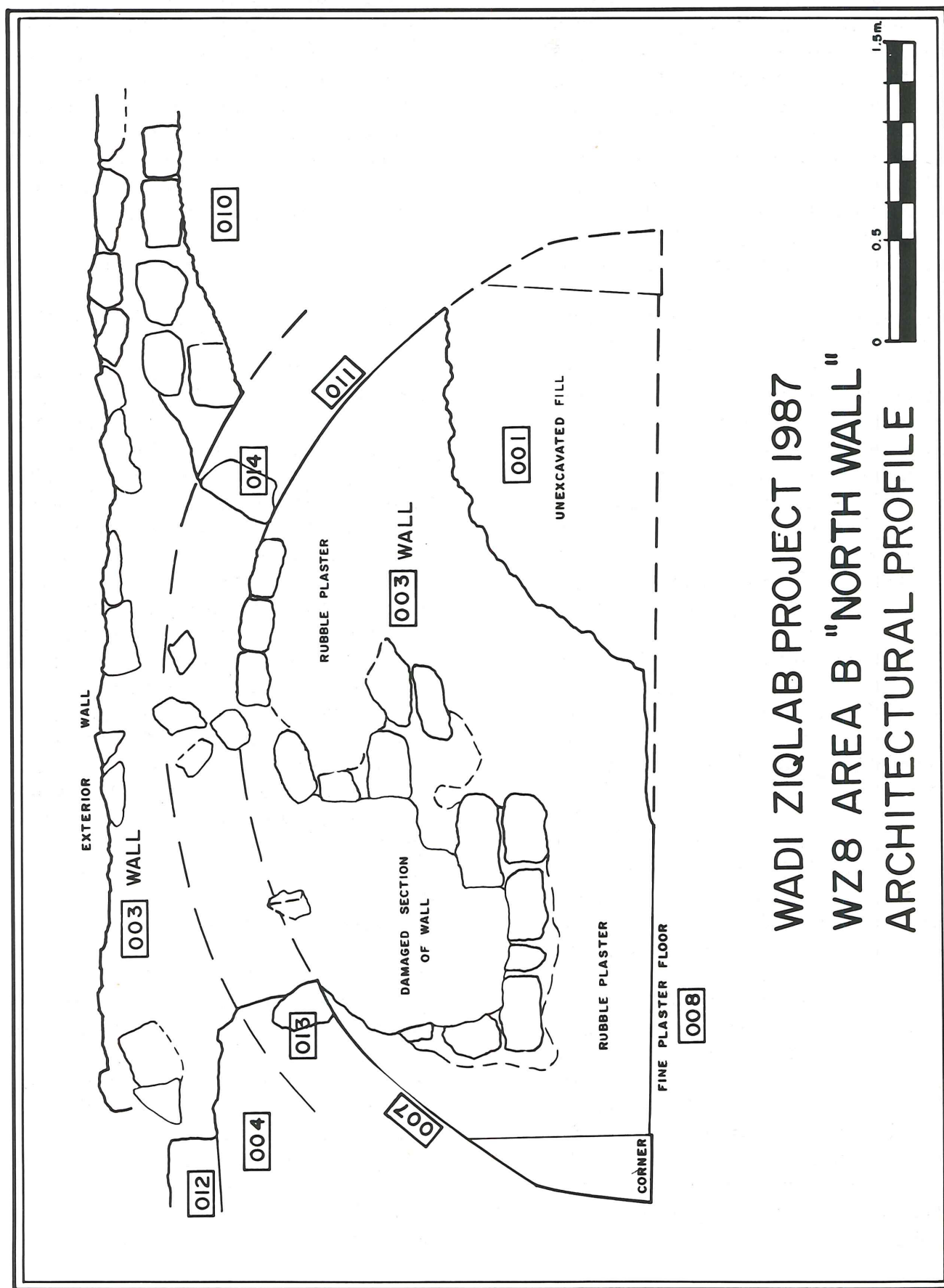


Fig. 6. Section through vault at site WZ8, Ras el-Qabūb.



three "towers" tested in 1987 was successful. The two circular structures, sites WZ9 and WZ116, appear to have been founded in the Iron Age (possibly late Iron I) and reused in late Roman-Byzantine and Mamluk-Ottoman times. The rectangular building clearly belongs to the Ottoman period, and may be contemporary with the 18th-century castle that occupies the northern acropolis of Tibna and exhibits similar construction details. Some of the artifacts, however, indicate that the structure was still in use in the late nineteenth century.

The functions of the structures, however, remain enigmatic. Although fragments of domestic pottery occur at the circular sites (and a mortar occurs at one), neither site shows evidence of living surfaces, domestic features, internal walls or roof. While both sites offer impressive views of the surrounding countryside, especially to the north, there is no evidence for occupation of the structures by small garrisons. Their close proximity, furthermore, is not what we would expect of signal stations. While they might easily have been used to corral sheep or other livestock, there is nothing in the soil profile at either site to suggest that animal dung has contributed substantially to soil development.

If anything, the structures make the most sense as repositories of large stones created during field clearance. Modern field clearances, held in place by quite respectable stone enclosure walls, have no function whatsoever beyond storage of excess rock and represent an amount of effort similar to that required to construct site WZ9. Conceivably the structures had dual or multiple functions, only one of which was to store excess rock. In times of conflict, for example, an isolated structure of this type might have been a convenient, temporary refuge. In later times farmers or pastoralists may have exploited the shade of the walls while eating, resting, or watching over their crops or herds.

Of the "towers", the rectangular structure at site WZ8 has the most commanding view. It may well have served as a watchtower for the village stronghold of Tibna. It is large enough to have served as a house, but the lack of windows, at least on the lower story, suggests that security may have been an important consideration in the construction of the building.

(EBB, RWR, PJS)

## SOUNDINGS AT A MILL, SITE WZ204

The water-powered mills that are commonly found in wadi bottoms throughout the highlands of Jordan have long been a chronological enigma. Most show evidence of use in the 19th or early 20th century. Nonetheless, it is tempting to speculate that their original construction dates much earlier, perhaps to Byzantine times, especially where there is clear evidence of reuse or rebuilding. Surface surveys in Jordan, in general, have had little success in determining whether such an early date for the mills is possible.<sup>18</sup>

At least three mills and an arched aqueduct occupy the banks of central Wadi Ziqlab. One (WZ204), close to a modern fish farm, was the subject of two very small soundings in 1987. Two others are located approximately 800m upstream, where the aqueduct crosses the wadi, carried on a double arch.

Neither sounding at the well preserved mill produced stratified evidence for a date earlier than the Ottoman period. Numerous iron artifacts and fragments of rubber and glass suggest a quite recent date, at least for the final abandonment of the mill. One of the soundings, however, did not reach sterile soil or bedrock; neither located a foundation trench.

Evidence currently available suggests that the mill at site WZ204 was constructed in the Ottoman period.<sup>19</sup> There are still some lines of evidence, however, for ear-

18. *E.g.* Parker 1987, p. 72. More recent work at el-Lejjun suggests an Ottoman date for the mills

there (S.T. Parker, pers. comm.).

19. For recent mills in Palestine see Avitsur 1960.

lier use of this or another mill on the site that call for further investigation. The small terraces above the mill exhibit fairly dense scatters of late Roman and Byzantine pottery, indicating a high probability of occupation during that time. The east wall of the milling room shows two distinct construction phases, with well cut limestone blocks below and smaller fieldstones above. Furthermore, deposits of travertine on the aqueduct feeding the mill, where it crosses the wadi upstream, are up to a metre in thickness, and must have accumulated over a long period of time.

(EBB)

## IMPLICATIONS FOR REGIONAL SURVEY

Probably the most significant result of the 1987 season goes beyond the specific problems of dating or understanding the individual sites that were the subject of soundings. When taken as a whole, the work of 1987 has some very important implications for the planning, cost and practicability of regional archaeological survey in the dissected highlands of Jordan.

The most startling of these implications is that erosion and colluviation in these areas is of such a magnitude that literally hundreds of archaeological sites could be so deeply buried as to be completely undetectable by the types of archaeological survey most common in Jordan today. Some of the wadi sections recorded by the geomorphological survey indicate that some 1.5m of colluvium may have accumulated in less than 1500 years. Site WZ200 is a good example of an important site that is so completely buried by colluvium that little or no evidence is visible on the surface.

It is somewhat ironic that the sites most often detectable by regional survey are those on the tops of hills and ridges, where they have suffered from severe

erosion. Removal of large portions of soil matrix may improve the visibility of these sites by leaving a "deflated" surface paved with artifacts, but at the cost of destroying stratigraphic evidence and of mixing assemblages of widely varying date.

Even where we have an intensive survey and well dated sites, these processes may result in site distribution maps that provide a far from accurate reconstruction of the ancient settlement landscape. We would expect the most ancient sites to be underrepresented, and we would expect the distribution of sites to be biased in favour of hill-tops at the expense of sites in valleys or wadi bottoms. Indeed the results of the 1981 Wadi Ziqlab Survey show exactly these patterns: most sites are on high ground and there are surprisingly few dating earlier than the Iron Age (except for deflated Palaeolithic sites on ridge-tops). Colluviation makes it especially difficult to detect such ephemeral sites as pastoral camps, and may partially explain our dearth of evidence for early pastoralism.<sup>20</sup>

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