MAIN-LAND RELATIONSHIPS IN THE ANCIENT WADI ZIQLAB: REPORT OF THE 1981 SURVEY

by
Edward B. Banning and Clare Fawcett

Introduction

The basic goal of the 1981 survey of the Wadi Ziqlab basin was to reveal patterns in the location of sites of various types with respect to environmental variables which we might expect to be culturally, and particularly economically, important to the ancient occupants of these sites. Possibly the distribution of sites and even isolated artefacts with respect to such variables will tell us something about changes in land use in the past. Such changes, one suspects, would be related to changes in climate, vegetational cover, technology, demographic structure, hydrology and other factors. If we can recognize patterns in the relationships between certain kinds of sites and environmental variables, it would follow that we can make predictions about where sites of the same kinds should occur in unsurveyed regions which shared with Wadi Ziqlab a broadly similar culture. We would then be able to test these predictions by examining suitable locations in further surveys. In an attempt to begin such a project, the authors, accompanied by Mr. Hikmat Ta'ani (representative of the Department of Antiquities of Jordan, Irbid), sampled one-fifth of the area of Wadi Ziqlab for archaeological sites and isolated artefacts in a wide range of environmental circumstances. Their base for the survey, from 21 November to 19 December, was a house in Deir Abu Sa'id, which lies on the southern watershed of Wadi Ziqlab.

Survey Methodology

In order to permit study of the relationships of sites to their environments it was obviously necessary to minimize biases in survey methodology which would give us a false impression of those relationships. If, for instance, we had surveyed only the ridge and plateau areas, which are most accessible, and had avoided more difficult terrain, we might have come to the erroneous conclusion that sites were always located on hill-tops, or were located predominantly on brown stony soils and bare rock. We needed as much as possible to give all types of environments within the Wadi Ziqlab drainage basin a fair chance of being searched for sites and artefacts. At the same time the terrain of the Ziqlab is very rough, while large parts of the survey areas are covered with oak forest or thick oak scrub. These factors make surveying very difficult; steep cliffs and thick scrub in some area are impassible.

As a result it was necessary to forge a compromise between statistical requirements and practical ones. We redefined the borders of the survey area to fit the Universal Transverse Mercator Grid Zone 36 (Series K737 maps at 1:50,000). This produced a gridded sampling frame of 115 sqares of 1 km^2 each. From these we randomly selected twenty squares with replacement, a 20% sample (three squares were selected twice), as targets for intensive survey by the methods described below. In addition we supplemented the statistical sample with a purposive survey of some sites known to exist in the *wadi* catchment and in areas like the western end of the *wadi* where important environmental zones had been missed by the random sample.

Within each of the randomly selected squares, the crew of three walked three or four transects, collecting sherds and artefacts, and recording sites, on the way. We were able to determine what proportion of the strips walked falls into each environmental zone, and use this proportion as a weight, or correction factor, when looking for associations

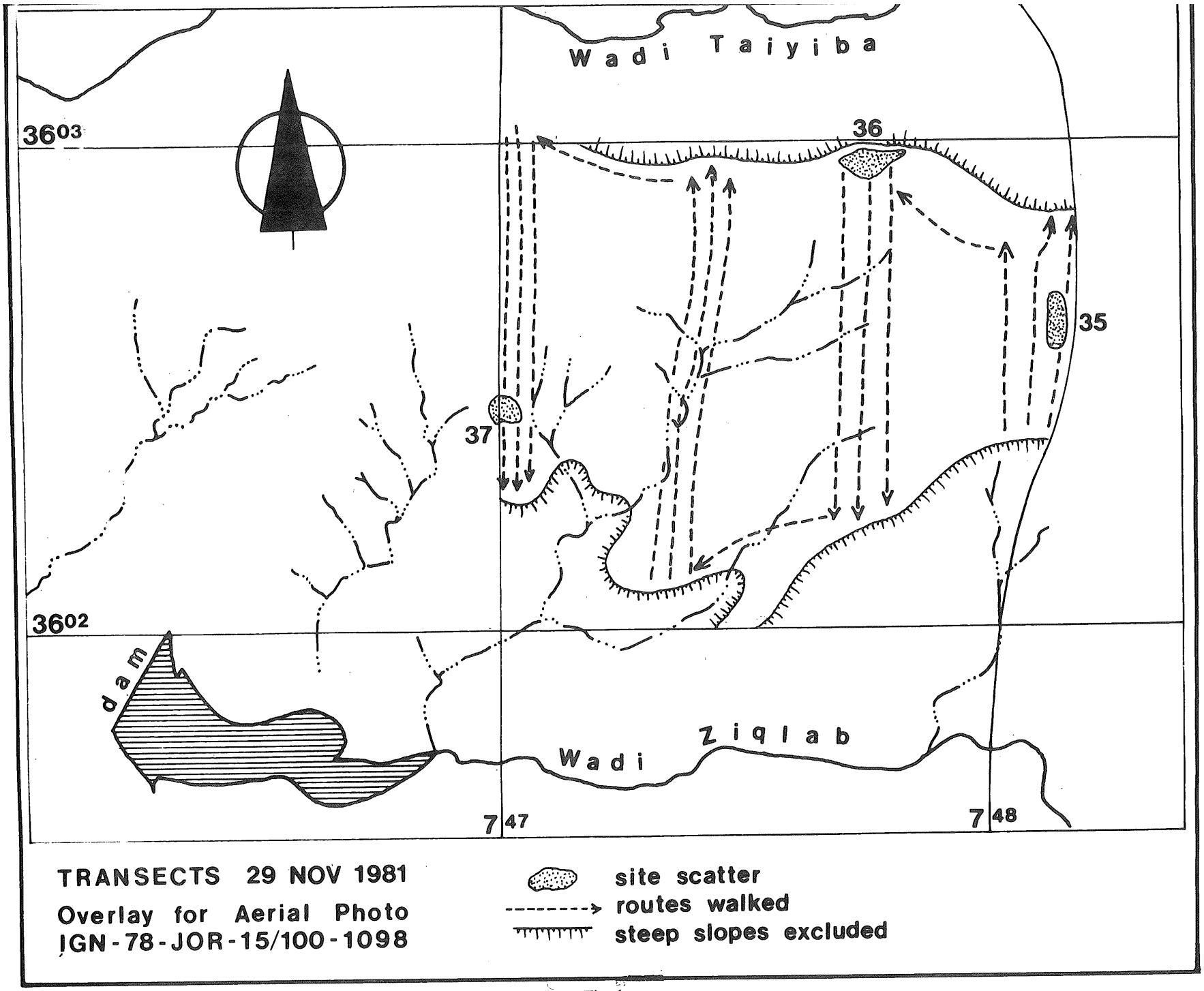

Wadi Taiyiba
36 03
36
35
37
36 02
dam
Wadi Ziqlab
7 47
7 48
TRANSECTS 29 NOV 1981
Overlay for Aerial Photo
IGN-78-JOR-15/100-1098
site scatter
routes walked
steep slopes excluded

Fig. 1

between site locations and environmental types. If, for instance, our survey walks took us through *terra rossa* soil five times as frequently as through brown stony soils, it is obvious that we would expect to find five times as many sites on the former as on the latter even if there is no correlation between site location and soil type. By weighting the sites on brown stony soils by a factor of five the two soil categories would then become comparable. We have also recorded not only the spacing interval between the transects and crew members, but the actual routes walked and site areas, on tracings which fit over aerial photographs of the surveyed squares. Figure 1 is an example of an overlay for an aerial photograph, showing the routes walked and sites discovered. Note that the grid lines are bent in some cases. This is due to monoscopic distortion and is particularly pronounced near the edges of the photograph and where the grid lines cross high ridges or mountains. Because of this distortion the scale is not exactly the same all over the photo, but the distance between grid lines should be one kilometre. While the transects also look bent in some cases, this is also due primarily to photographic distortion, and they in fact run north to south at 250-metre intervals. Note also that the transects stopped at the edges of scraps too steep to cross, but we can measure these areas (where the probability of finding settlement sites is near zero anyway) and account for them statistically.

We collected sherds and lithics on the survey in the following ways. Whenever we believed that we had encountered a site, defined either by a marked increase in the density of artefacts on the ground or by the presence of architecture or other artificial features, we each collected a small sample of material using our own judgement as to what might be diagnostic in terms of helping to date the site. These we term "purposive" samples. In a few cases, where sherd densities seemed reasonably high, we collected all sherds and artefacts within 5-m^2 circles arbitrarily located on the site, and called the material from each of these circles a "random" sample. In addition we often collected purposive samples of possible diagnostic artefacts and sherds which we encountered on our transects but which did not appear to be associated with any sites. The items in these samples we term "isolated finds." Analysis of the pottery and other finds will appear in the final report.

In order to meet the basic goal of the survey and to test hypotheses concerning changes in land use, it was necessary to ensure that our survey strategy would provide the categories of data required. The statistical sample should provide a fairly representative view of site locations. The collected material should provide criteria for dating most of the sites. In terms of land use we would also like criteria for dividing sites into functional categories. For some sites, like aqueducts, cisterns or quarries, the function is fairly obvious. For simple scatters of sherds or lithics it is not. Many of these will be settlement sites, but we would still like to know whether they represent the settlements of agriculturists, pastoralists, or hunter-gatherers. Others may be non-settlement sites, like charcoal-burning camps or cemeteries. In this unhappy situation, where we do not have other evidence in the form of architecture or features we will facilitate preliminary analysis with the assumption that any sherd scatter more than 500 m^2 in an area represents an agricultural settlement, while smaller ones we will treat as camps of various types. The patterns of site location themselves might suggest to us what resources may have been exploited at each "camp," permitting tentative functional classifications which we may test against a range of relevant environmental factors, or against the contents of the artefactual assemblages.

The Environment Of Wadi Ziqlab

The arched rim of the Jordan Graben has resulted both from uplifting of the Transjordanian Block on its western side as well as down-faulting towards the Graben further to the west (Bender, 1974: 23). In northern Jordan these disturbances of rather thick sediments are characterized more by block-folding, flexuring and

tilting than by the block-faulting seen to the south and east (Bender, 1974: 115), and the Wadi Ziqlab drains the northern part of an upwarped dome around Ajlun, the western side of the "arched rim" immediately north of this dome, and a narrow band across the downfaulted Cretaceous and later sediments bordering the Jordan Graben. Significant sub-parallel faults occur in the narrow western part of the Ziqlab drainage, and there are local occurrences of complex faulting farther upstream, as near Inba (Bender, 1974: 116, 121: Fisher, *et. al.,* 1966: 7). In falling from the rim of the Transjordanian Block at over 1075 m. to the bottom of the Jordan Graben at —200 m., the wadi and its tributaries have deeply dissected most of the drainage basin. In the upper parts this dissection has a mature appearance and rounded relief with an amplitude of 50.00 to 150.00 metres, but below a major rejuvenation point in the neighbourhood of Tubna (probably consequent to renewed faulting in late Tertiary or Pleistocene times) the stream has incised a steep-sided gorge and the amplitude of relief is 200.00 to 250.00 metres (Fisher, *et. al.,* 1966: 4-7).

This geological structure has had important consequences for other aspects of the environment. Due to orographic effects the highest mean annual rainfall occurs at the rim of the Jordan Graben, where it is more than 500 mm., but the marked increase in apparent aridity towards the western part of the Ziqlab valley cannot be explained in terms of precipitation alone. Even the driest, most westerly part of the basin receives a mean annual rainfall greater than 300 mm., and the marked differences in vegetation between the eastern and western ends of the valley must "owe more to temperature and evaporation contrasts than to absolute differences in precipitation" (Fisher, *et. al.,* 1966: 13). The contrast in mean daily temperature between the cooler highlands and the mouth of the valley is in the order of 6 C° (Climatic Altas of Jordan, 1971: 12-24).

In the eastern highlands of the Ziqlab, Mediterranean zone vegetation still includes important stands of *quercus calliprinos* forest and open woodland, on predominantly Terra Rossa soils derived from crystalline limestones of the Ajlun series. The climax vegetation would have been an association of *Quercus calliprinos-Pistacia Palaestina,* but the *Pistacia* is relatively infrequent at present (Zohary, 1962: 112). Towards the west, the woodland becomes more open, with a gradual transition into a *Quercus ithaburensis-Styrax officinales* association on the ridges bordering the Wadi Ziqlab. Some *Styrax* was also observed in the highest parts of the *wadi* catchment (on the slopes southwest of Khirbet Mahrama, site 60). In the lowest parts of the *wadi* there is Irano-Turanian shrub steppe with climax vegetation of the *Zizyphion loti* alliance (Zohary, 1962: 112), and local concentrations of hydrophilic vegetation occur in and immediately downstream from springs at the bottom of the Ziqlab gorge (particularly near Tell Abu el Fukhkhar, site 43). Anthropogenic alteration of the climax vegetation is especially marked in the extreme east, all along the northern edge, and in the western third of the survey area, where both cultivation and grazing have removed significant portions of the natural vegetation. In the south central part of the basin there is little modern exploitation, although it is clear that most of the forest even here has regenerated only in recent times, as evidenced by the presence of dams and agricultural terraces in the forests (sites 67-69, 74-76).

The principal non-agricultural resources of the area are limestone and chert as building material, chert and flint for stone tool manufacture, oak for charcoal and tanning, and water from springs estimated at 8 million m^3 per year (Burdon, 1959: 73; cf. H. Vierhuff and K. Trippler, 1977: 6-7). The A7 and B2 limestones and chert bands of the Ajlun and Balqa series, which cap most of the western half of the Ziqlab basin (Fig. 2), are part of the most important aquifer system in Jordan, recharging with 40-80 mm. of water per year, or a volume of 9 million m^3 per year (Vierhuff and Tripper, 1977: list 5.1.1., map HG 5.1). This groundwater is very close to the surface,

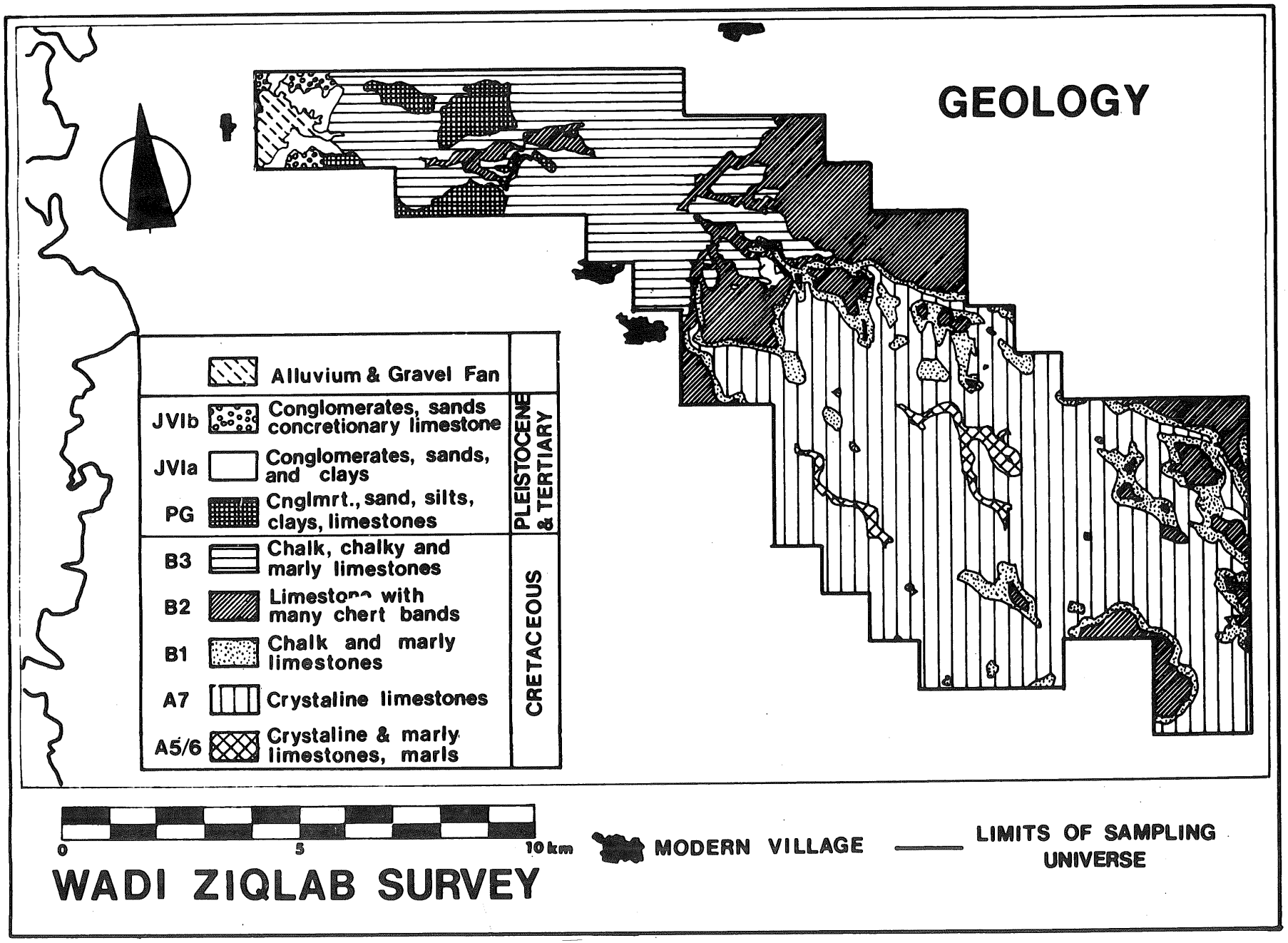

GEOLOGY
Alluvium & Gravel Fan
JVIb Conglomerates, sands concretionary limestone
JVIa Conglomerates, sands, and clays
PG Cnglmrt., sand, silts, clays, limestones
PLEISTOCENE & TERTIARY
B3 Chalk, chalky and marly limestones
B2 Limestone with many chert bands
B1 Chalk and marly limestones
A7 Crystaline limestones
A5/6 Crystaline & marly limestones, marls
CRETACEOUS
0
5
10 km
MODERN VILLAGE
LIMITS OF SAMPLING UNIVERSE
WADI ZIQLAB SURVEY

Fig. 2

permitting exploitation even where there are no naturally occurring springs.

Site Distributions

The very fact that the bulk of the sites recorded during the 1981 Wadi Ziqlab survey come from exploration of only 20% of the wadi's total area excludes the possibility of presenting complete distributions of the sites of various periods, quite apart from omissions due to site destruction or invisibility (the final report will deal with the problems of differential visibility and the probability of site destruction). But the concern of this project is less the physical distribution of sites than the settlement systems and resource exploitation systems which are responsible for that distribution. As this is a preliminary report, it is premature for us to offer tests of specific hypotheses regarding site location criteria or the relationships between these criteria and models of economic exploitation of the Wadi Ziqlab in the past. These will appear in the final report. It is possible, however, for us to offer at this stage of analysis maps of observed site distributions in a number of chronological periods, with preliminary observations on especially favored environmental circumstances, and on apparent changes in preferences for site location. We may also suggest hypotheses for the causes of these changes to be investigated further in the final report. Since the 20% sample should be representative of the survey area as a whole (once we acount for differences in site preservation or visibilty, and for the areal extent of environmental zones), it will be possible to make statistical evaluations of the strength of these hypotheses in the analyses to follow.

The maps require a certain amount of explanation. Since there are problems with the dating of some of the sites, those whose date is reasonably secure are represented by a solid square or triangle, while sites of doubtful date or loci of sherds too few in number to represent certain occupation during a given period are marked by a hallow square or triangle. Squares represent sherd scatters, triangles represent lithic scatters, and large circles represent known sites not included in the survey because of inaccessibility (usually military) or distance from the sampling universe.

One should also note that "periods" represented on the map have been grouped so as to correspond whenever possible to the most obvious changes in the pottery or lithic assemblages and do not necessarily correspond to political or presumed ethnic units. The readings are only provisional in many cases, and, until detailed analysis of the pottery and flints is complete, these groupings based on similarities of ware, technology and morphology seem the most convenient units of preliminary analysis of land use changes. Since there is no reason to assume that land use strategies, agricultural technology or ceramic assemblages should have a one-to-one correspondence with political units anyway, we feel that chronological units on these grounds are as useful as any of similar breadth. If possible a more refined chronology will permit finer chronological distinctions in the final report, in case there were any short-term changes in land use which such broad divisions obscure.

Lower Paleolithic (Fig. 3)

The length of time which has elapsed since the end of the Acheulean makes questionable the assumption that we can reconstruct the physical environment of the Ziqlab during the Acheulean to a degree sufficient for analysis. Not even the topography of the survey area has been immune to major change during such a long period, and the hardrock geology is almost the only environmental dimension in which we can have confidence.

Nonetheless Acheulean occupation of the Wadi Ziqlab seems to have been sporadic. The only biface recovered from the 1981 survey was an isolated find (x.255), probably indicative only of communication between the lush Jordan Valley to the west and grasslands to the east. Sites 16 and 63 are located near the upper reaches of small branch *awdiyah* overlooking what may have been good

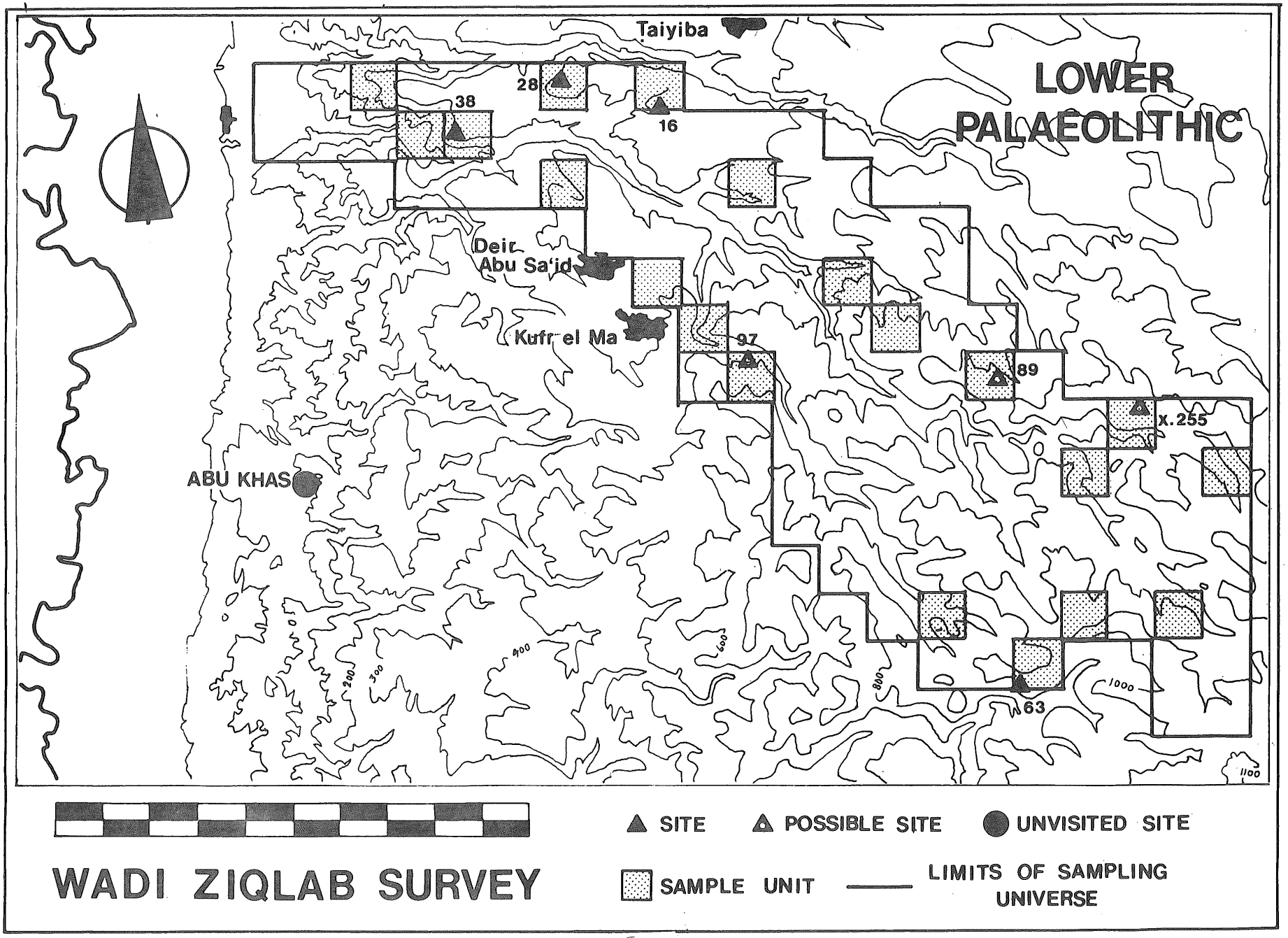

Taiyiba
LOWER
PALAEOLITHIC
28
38
16
Deir
Abu Sa'id
Kufr el Ma
97
89
x.255
ABU KHAS
200
300
400
600
800
1000
1100
63
SITE
POSSIBLE SITE
UNVISITED SITE
WADI ZIQLAB SURVEY
SAMPLE UNIT
LIMITS OF SAMPLING
UNIVERSE

Fig. 3

communication corridors, for both man and his game, between the deeper valleys and the plateau. Sites 28 and 38, on the other hand, are located above high cliffs, where there must have been good visibility of herd movements below but little direct opportunity for hunters to act on those movements (cf. Rollefson, 1981: 7). All of the lithic finds above the Jordan Valley's lower slopes which seem to belong to the Acheulean show a tendency to be located on or very near outcrops of chalk and marly limestones. Unless there is some theory to acount for this tendency, however, the correlation may be a spurious one.

Middle Paleolithic (Fig. 4)

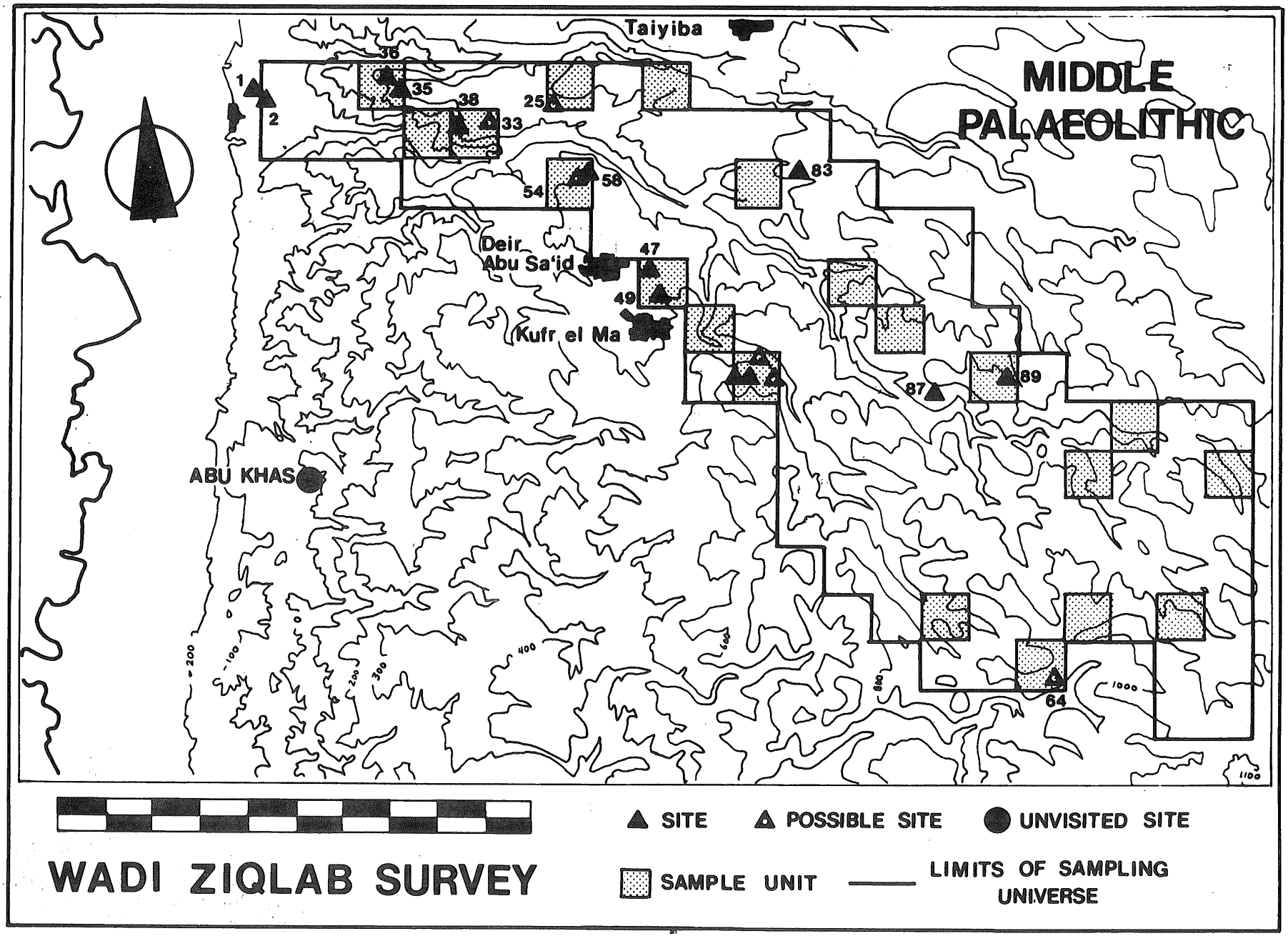
The greater diversity of sites and site environments relative to the preceding Acheulean suggests that there was more consistent exploitation of the highlands east of the Jordan Valley during the Middle Palaeolithic rather than, possibly, a single type of exploitation by itinerants during the Acheulean. The most important Levalloiso-Mousterian sites are located close to the Jordan Valley. When freshwater Lake Samra lay at the mouth of the Wadis Ziqlab and Taiyiba at the beginning of the Upper Pleistocene (Bender, 1974: 26, 95-97) sites 35 and 36 would make good bases for the hunting of herd animals which sometimes congregated near the lakeshore as well as lacustrine game like waterfowl or even fish. It is reasonable to assume that Lake Samra embayments at the mouths of the Ziqlab and the Taiyiba contained marshes where the streams slowed down upon entering the lake. Such an environment would be an attratctive place for exploitation by Mousterian hunters and gatherers. Sites 1 and 2 are on two knolls which would have been on a peninsula jutting into Lake Lisan during its maximum extent, but site 1 is on a western slope, the lakeward side of the knoll, and may have been occupied after the lake began to retreat below the —200 m. level. Lake Lisan was much more brackish than its predecessor Lake Samra and gradually shrank towards the modern Dead Sea over the Upper Pleistocene.

Some of the sites, like 93-95, 89, are clearly factory sites and probably quarry sites. The chert from which the flakes and cores at these sites are made is of rather poor quality and invariably has a deep orange patina, possibly from lying in terra rossa soil. While there are many bands of chert in the A7 series crystalline limestone which outcrops at all of these sites, the precise identification of the chert source for these sites has not been established. No good Levallois blades or points occurred on these sites, but crude cores and large flakes lay on the surface in great numbers.

Above the cliffs overlooking the Lower Ziqlab are several Levelloiso-Mousterian sites. We have already noted that some of these, like 35 and 36, may have been located so as to permit easy visibility of herd movements along the valley. While the valley slopes are much too steep for hunters to have moved down them quickly enough to surprise any game below, possibly lookouts at these points could signal to hunters at strategic points along the *wadi* course. Site 87, on a small, round spur overlooking a meander in the Wadi 'Ain Sirin, is probably an admirable choice as an ambush point. Sites 33, 35, 36 and 38 are all located on or very near the interface between the B3 chalky limestones and the PG conglomerates, where flint and chert are much rarer than in the B2 silicified limestones (there seems to have been virtually no exploitation of B2 deposits, where chert beds are up to 2.00 m. thick locally. Bender, 1974: 78). None of these sites is likely to be a quarry site, and cores are not common on them. The artefacts usually show a smooth grey-tan patina, but the source of the raw material is unknown. It is in any case of a higher quality than the chert from sites 89, 93-95.

Upper Palaeolithic to Neolithic

No immediately obvious patterns emerge from the distribution of Upper Palaeolithic sites in the Wadi Ziqlab catchment. In at least ten instances they are located on former Middle Palaeolithic sites, and it seems as though there was still


MIDDLE PALAEOLITHIC
Taiyiba
Deir Abu Sa'id
Kufr el Ma
ABU KHAS
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600
800
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1100
SITE
POSSIBLE SITE
UNVISITED SITE
SAMPLE UNIT
LIMITS OF SAMPLING UNIVERSE
WADI ZIQLAB SURVEY

Fig. 4

a preference for sites on top of cliffs overlooking the *wadi,* although more sites began to occur along shallow branch *awdiyah* which would have provided access to the gorge. Since the Pleistocene Lake Lisan shrank there was deeper incision of the *wadi,* perhaps making such access corridors more valuable. One interesting phenomenon which requires investigation is the apparent avoidance of the highlands in the southeast half of the Ziqlab catchment. If it is real it suggests that the environment of the highlands was different than it had been during the first half of the Upper Pleistocene. The most probable difference would seem to lie in the density or composition of the vegetation, which would be sensitive to climatic fluctuation, while also having strong effect on the movements of animals, including humans.

Most of the artefacts from these sites are flakes with few or no diagnostic traits, and many are best dated "Upper Palaeolithic or later" (Rollefson, personal communication).

None of the sites discovered during the survey produced artefacts diagnostic of the Kebaran, Geometric Kebaran, or Natufian.

Scattered occurrences of "late" flints, most of which are probably Neolithic or Chalcolithic, occurred throughout the survey area, but again there were no good diagnostics of the PPNA, PPNB or Pottery Neolithic. We have not identified any sherds as definitely Neolithic, although some crude ones could yet turn out to belong in that period. Ibrahim, Sauer and Yassine reported possible Neolithic/ Chalcolithic sherds at Khirbet 'Araq er Rashdan (site 5, their site 44) (1976: 49), but this site is right on the edge of the Jordan Valey. It is possible that the highlands were still too heavily forested during the Neolithic to permit agricultural exploitation.

Chalcolithic and Early Bronze Ages

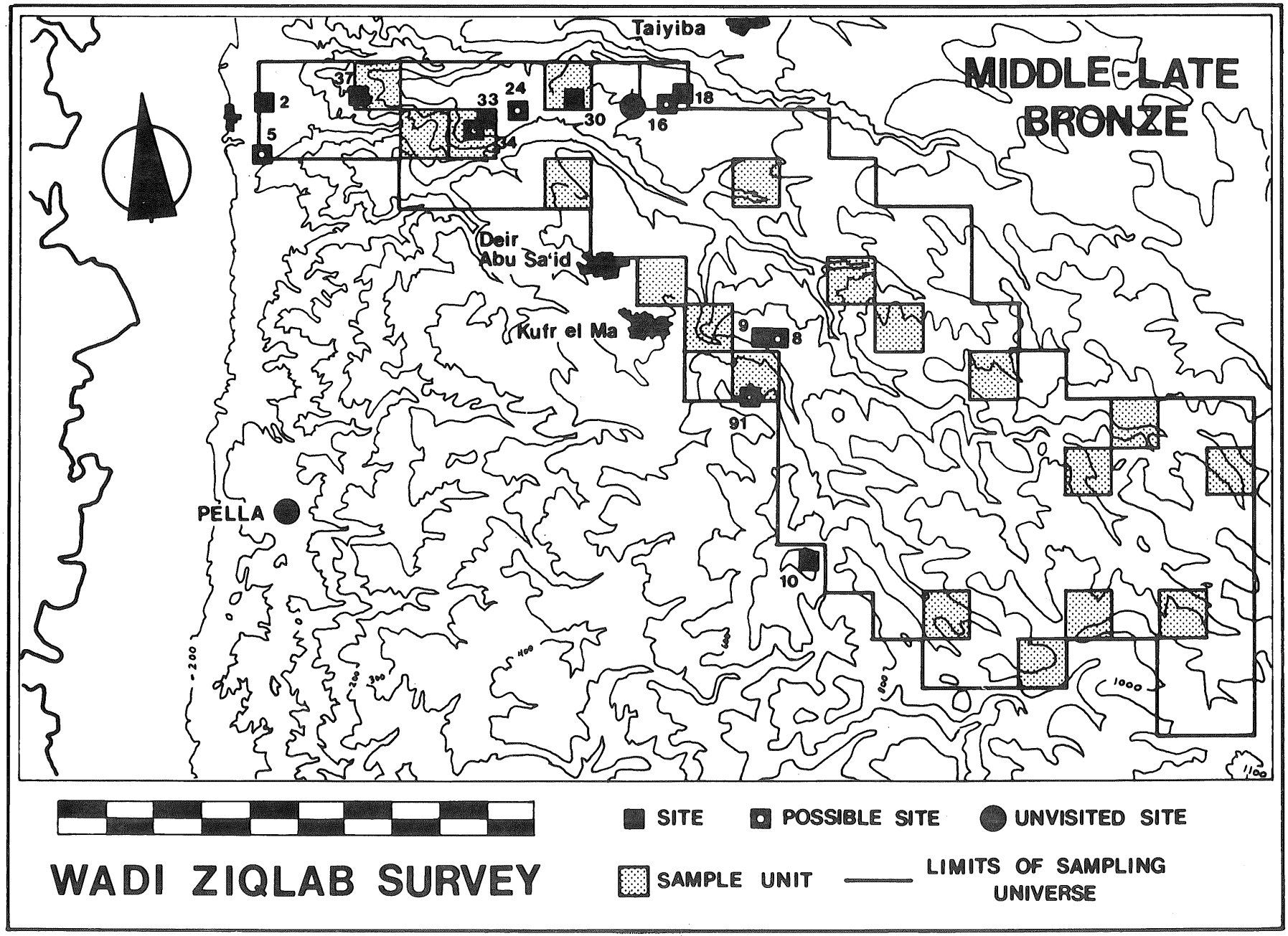
Occupation of the Wadi Ziqlab catchment seems to have been very slight during both these periods. Probable Chalcolithic sherds from sites 6 and 31 are rare and probably represent only transitory exploitation of the hills east of the Jordan Valley by hunting expeditions or herders. Early Bronze occupation also appears to have been slight. Mittmann (1970: 60) noted some EB I and III sherds at Khirbet Mahrama, our site 60, but in two visits to the site we found no sherds which were certainly Early Bronze. Glueck claimed that there was EB I-II occupation at Tell el Fukhkhar (1951: 194) but all we found on the site were Roman and Byzantine sherds (our site 43). Glueck also reported "considerable numbers of EB I(-II) sherds" at Sibya (1951: 193) but we were unable to visit this site, about 500.00 m. west of site 16, for military reasons. Glueck even reported two dolmen fields in the survey area (1951: 196, 200-201). The places he describes should lie at about 2160/2090 and 2190/ 2140 by Palestine Belt Grid coordinates (Clark 1880 spheroid), but at present there is no sign of them. The stone piles which appear at the former "site" are obviously modern field clearances and bear no resemblance to dolmens, or even to "broken-down circular bases, on which, in all probability, large dolmens once rested" (Glueck, 1951: 196). In all probability, Glueck was mistaken in his identification of dolmens in the Ziqlab area.

A large number of flints provisionally idenitified as "Neolithic or later" may well belong in the Chalcolithic or Early Bronze, but none occurred in assocation with sherds of these periods, and the dating is uncertain.

Middle to Late Bronze (Fig. 5)

Again good diagnostics are generally lacking for this period in the *wadi,* and we will follow the convention of the Australian expedition to nearby Pella in grouping Middle and Late Bronze (A. Walmsely, personal communication) whose wares tend to be similar.

Glueck reported "clear MB I" and possible LB II occupation at Sibya, but otherwise no one has suggested MB or LB presence in the Wadi Ziqlab. The preliminary results of the 1981 survey, however, suggest rather greater use of the


MIDDLE-LATE BRONZE
Taiyiba
Deir Abu Sa'id
Kufr el Ma
PELLA
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POSSIBLE SITE
UNVISITED SITE
SAMPLE UNIT
LIMITS OF SAMPLING UNIVERSE
WADI ZIQLAB SURVEY

Fig. 5

wadi during this time than we expected. The evidence is, admittedly, scanty and we have been forced to mark many of the sites as "possible" or doubtful, but one hypothesis worthy of further investigation is the possibility that colonization of the highlands by agriculturists ocurred during the second millenium B.C., while oak forests had discouraged intensive exploitation of the area in Early Bronze times. Obviously alternative hypotheses are numerous, and the low density of MB-LB sherds on most of these sites may suggest small camps more than permanent farming settlements. Middle Bronze, and to some extent Late Bronze, towns in the Jordan Valley may have utilized such camps in the highlands to extend their catchments into areas where they could exploit oak for charcoal fuel or pasture for the grazing of sheep and goats. These are among the hypotheses to be explored in the final report. It should also be noted that sites 9 and 10 could be MB-LB forts or watchtowers rather than agricultural settlements, although the architecture visible on them more probably belongs to the Iron Age. In general the MB-LB sites tend to be located in the foothills and on the ridges overlooking the lower Ziqlab.

Iron I-II (Fig. 6)

It is during the Iron Age that occupation of the Wadi Ziqlab drainage basin became well established. All of the areas in which we see modern villages seem to have been exploited during the Iron Age, and some of the sites (60, 70 and Glueck's Sibya, 19651: 193) seems to have been important villages. In addition there are possibly Iron II forts or watchtowers at 9, 10 and Sibya. The placement of these along with sites 111 and 60 suggests that a major communications route between the Jordan Valley and the highlands around the Iron I-II sites of Khirtbet Heraqla (Glueck, 1951: 105-106) may have passed along the Wadis Sumeil, 'Ain Zubiya, and Wa'ra.

The sherd scatter at site 28, where we found many Iron I-II diagnostics, seems to result from the recent robbing of shaft tombs there by charcoal burners camping on the site.

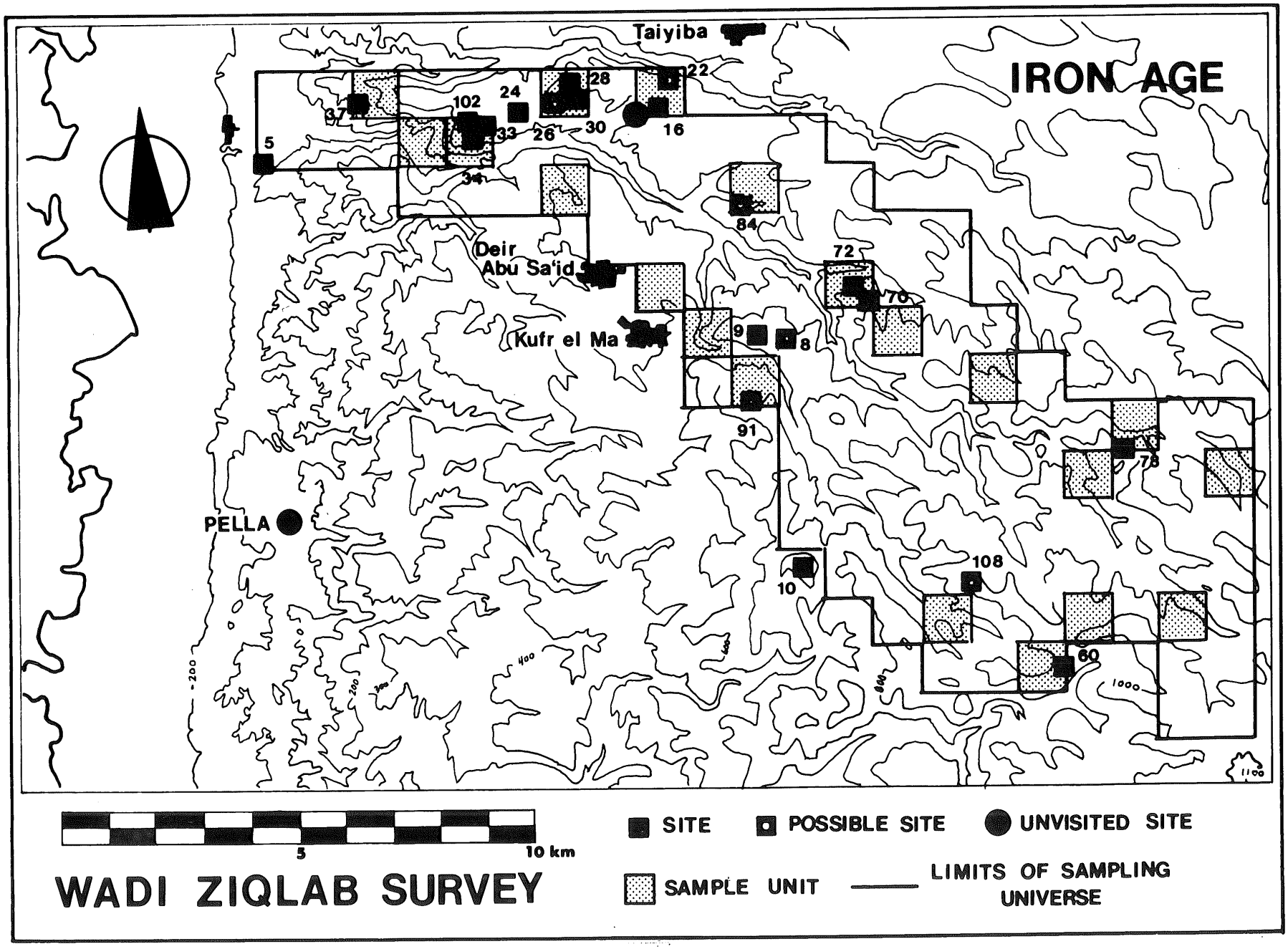
Persian and Hellenistic

We recognized no Persian sites in the survey area during the 1981 season, but are able to report some late Hellenistic occupation of the Wadi Ziqlab. The modern village of Jenih es Safa seems to overlie a late Hellenistic site (Mittmann, 1970: 41), and while we did not find any Hellenistic sherds on site 80, Mittmann reported a sparse scatter including sherds from the second century B.C. onwards (1970: 42). Sites 4 and 5 near the mouth of the Ziqlab showed some late Hellenistic and early Roman occupation at Sibya, very near Jenin es Safa (1951: 193). Site 10, Ras Birqish, also appears to have been occupied at this time. In general, occupation from the end of the Iron II to about the beginning of the second century A.D. seems to have been very slight in the Ziqlab region.

Roman-Byzantine (Fig. 7)

Occupation of the Ziqlab basin grew to a definite peak in the Byzantine period and continued to be very dense during Umayyad times. Almost half of the sites recorded during the 1981 survey were occupied during the Byzantine period. Sites 4, 43, 79, 106 and 109 were probably important villages in late Roman and Byzantine times, occupying the hinterland between the large towns of Tabaqat Faḥl (Pella) to the southwest, Jerash (Gerasa) to the southeast and el Ḥusn to the northeast. What tenuous evidence we have for the date of two aqueducts (sites 44 and 57) suggests that they belong in this period. Clearly it was at this time that the most intensive agricultural exploitation of the area became established. There is some evidence for placing many of the isolated cisterns in this period as well (sites 16, 19, 61, 79, 98 and possibly 20, 69, 77, 80 and 92).

Some architectural fragments also suggest that there were at least some large public buildings in the area. At site 43 we observed wall lines of a large structure capping the acropolis as well as several


IRON AGE
Taiyiba
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PELLA
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WADI ZIQLAB SURVEY
SAMPLE UNIT
LIMITS OF SAMPLING UNIVERSE

Fig. 6

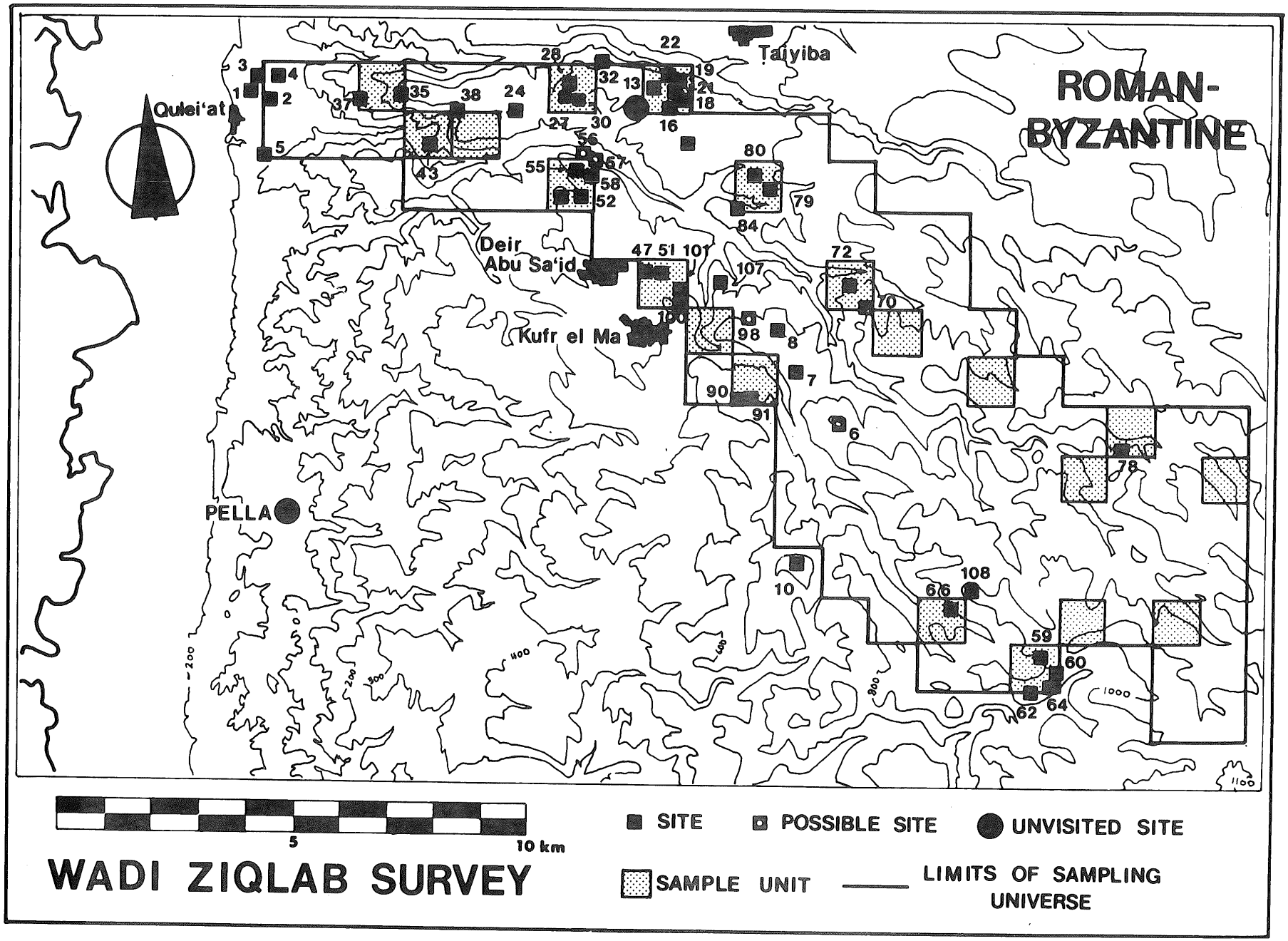
ROMAN-
BYZANTINE
Qulei'at
Taiyiba
Deir
Abu Sa'id
Kufr el Ma
PELLA
WADI ZIQLAB SURVEY
5
10 km
SITE
POSSIBLE SITE
UNVISITED SITE
SAMPLE UNIT
LIMITS OF SAMPLING
UNIVERSE

Fig. 7

unfluted column drums. These must have been less visible when Glueck visited the site, as he reported only "the ruins of some nondescript buildings" within what appeared to be a fortification wall on top of the hill (1951: 194). Mittmann found evidence for churches at Jenin es Safa (1970: 41) and Marhaba (site 106) (1970: 42-43), as well as a lintel inscribed in Greek at Zubiya (site 108) and a (later Byzantine?) corinthian column capital at Rihaba (site 109) (1970: 58).

Given the high density of Byzantine sites in the area one might have expected fairly dense occupation on terra rossa soils which cover so much of the highlands. In fact Byzantine peasants seem to have avoided building sites on these soils, preferring to build on or next to patches of brown stony soil or on the brown steppe soils in the foothills. Possibly they were reserving the terra rossa soils for intensive grain cultivation. The terra rossa has a heavy texture and a high saturation percentage, so that it will store available water in quantities adequate for the growth of crops well into summer (Fisher, *et. al.*, 1966: 21-22). At the same time the high clay content of terra rossa might not be conducive to human settlement where good drainage is required. But the brown stony soils have similarly high saturation percentages and clay content (Fisher, *et. al.*, 1966: 26). Perhaps, then, the explanation lies in the greater fertility of the brown stony soils, particularly in available potash (Fisher, *et. al.*, 1966: 27, profile 14). This higher nutrient content conceivably may have overridden the difficulty of plowing among the stones.

Late Byzantine-Umayyad

Occupation of the Wadi Ziqlab during this period is a continuation of the earlier Byzantine and was apparently of similar intensity. The number of sites occupied was still high but seems to have declined somewhat by Umayyad times. About ten sites may be new foundations in late Byzantine or Umayyad periods, of some thirty-six sites, but all of the larger villages were still on former Roman sites and even the "new" sites probably only represent small shifts of a few hundred metres from sites already existing in the previous two centuries or so.

Ayyūbid-Mamlūk (Fig. 8)

There is little evidence for occupation of the Ziqlab between Umayyad and Mamlūk times, but it is hard to believe that the population dwindled away entirely during this time, particularly since the Mamlūk settlement system seems to have developed right out of the Byzantine-Umayyad one, albeit on a smaller scale. While there are only about one-third as many Mamlūk sites as Byzantine ones, they are nonetheless distributed in almost exactly the same way. It is possible that a revival of agricultural exploitation in Mamlūk times corresponded with a clustering of population into fewer, larger, villages, while it had been common for farmers during the Roman and Byzantine periods to maintain smaller hamlets and individual farmsteads close to the fields. If this is the case, the Mamlūk settlement subsistence system may mark the transition from a Byzantine agricultural strategy to the strategy employed in the area by farmers during Ottoman and modern times.

The most important Mamlūk settlements seem to have occurred at sites 24, 60, 79, and possibly 108 and 109 (now obscured by modern settlement). At site 60, Khirbet Mahrama, in particular, there are many traces of rather large stone buildings which probably date from this time, since Mamlūk pottery is dominant on the site and since there was no major occupation there since the Mamlūk period.

Closing Remarks

The following are among the hypotheses to be tested over the coming year.

1) Chalcolithic and Early Bronze sites occur where we would expect natural clearings and not where there was probably climax oak-pistacio forest. Clearing of forest would not be

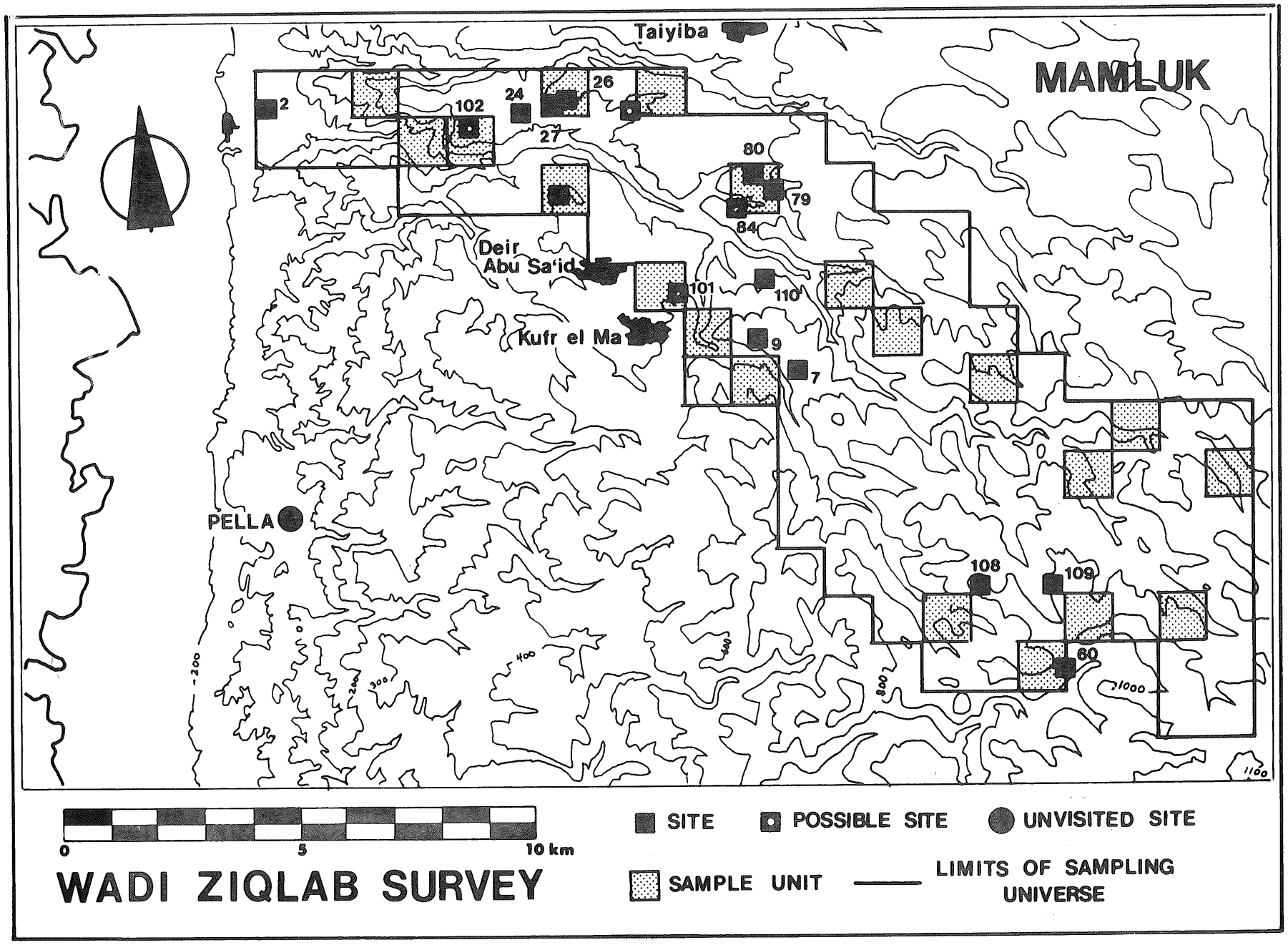
Taiyiba
MAMLUK
2
102
24
26
27
80
79
84
Deir
Abu Sa'id
101
110
Kufr el Ma
9
7
PELLA
108
109
60
200
300
400
600
800
1000
1160
0
5
10 km
WADI ZIQLAB SURVEY
SITE
POSSIBLE SITE
UNVISITED SITE
SAMPLE UNIT
LIMITS OF SAMPLING UNIVERSE

Fig. 8

worthwhile for small-scale grain agriculture by dry-farming or for pasture.

2) Expansion into heavily forested zones occurred during the Middle Bronze period.
3) Expansion into heavily forested zones occurred during the Iron I period.
4) Simple techniques of irrigation and soil collection were applied to fields in the bottoms of small valleys during the Iron II period.
5) Irrigation by rock-cut aqueducts became available during the Roman-Byzantine period to facilitate the production of cash crops.
6) Irrigation was abandoned at the end of the Umayyad period in favour of subsistence dry-farming.
7) Roman-Byzantine pastoral camps[1] occurred very close to agricultural villages and in fields suitable for grain cultivation (presumably after harvest season).
8) The ethology of sheep and goats[1] will permit seasonal migration of pastoralists between the Jordan Valley and the eastern plateau in such a way that crossing of the highlands bordering the Valley will occur after the grain harvest.

Some other hypotheses will require testing by further fieldwork.

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[1] In order to make these tests operational we need to know more about ways to recognize and interpret ancient pastoral camps, and about herd management and sheep-goat ethology. Some of the sites discovered during the 1981 survey of Wadi Ziqlab appear to be ancient "bedouin" encampments, with very low density scatters of small (trampled?) sherds and sometimes low, stone enclosures. Other surveys in Jordan have also revealed the possible camps of ancient pastoralists. An ethnoarchaeological survey concentrating on the Beidha region in southern Jordan will address these and other problems bearing on ancient pastoralism (Banning and Köhler, forthcoming; cf. Hole 1974; Juli 1978; Miragliuolo 1979).

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