

Item 7(iii)
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BRITISH WESTERN NEGEV EXPEDITION

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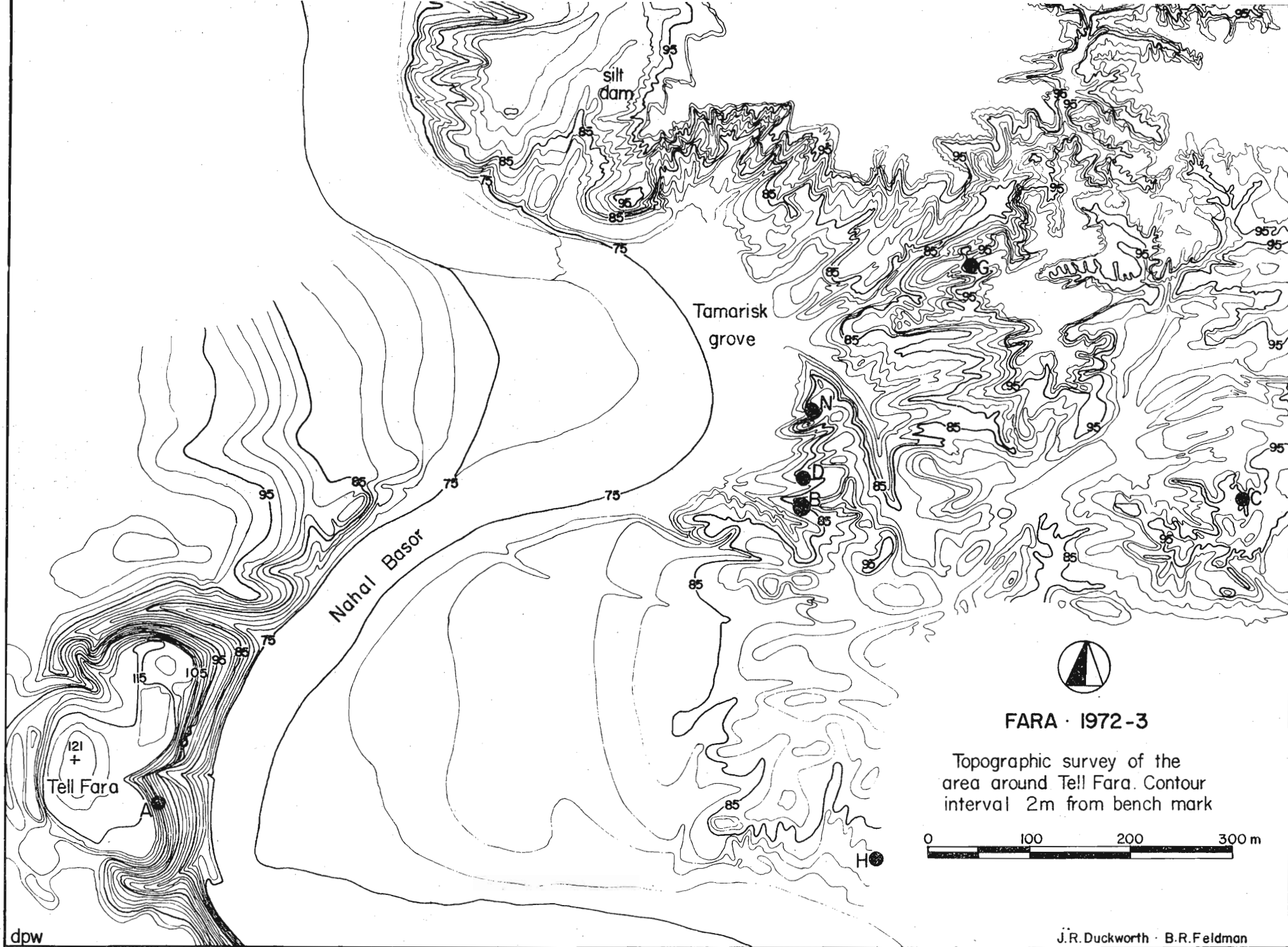
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FARA · 1972-3

Topographic survey of the
area around Tell Fara. Contour
interval 2m from bench mark

0 100 200 300 m

BRITISH WESTERN NEGEV EXPEDITION

FARA, 1973

The following report, together with its appendices, is a preliminary statement of the second season of the British Western Negev Expedition, which worked during the month of July and one week of August in the area around Tell Fara (S) Sharuhen in the Nahal Basor (Wadi Ghuzzeh). The findings are preliminary and await further confirmation both by laboratory tests and further site analysis. The report was completed within six days of finishing the survey.

Theory

The interdisciplinary study leading to a full environmental archaeological survey of this one specific area is by now well documented. (Price Williams, 1973, Environmental Archaeology in the Western Negev, Nature, April 20; Price Williams, 1973, Preliminary Report on the Environmental Archaeological Survey of the Area around Tell Fara in Archaeological Theory and Practice, Seminar Press) The Fara '72 report was widely circulated and contained the basic aims and methods of the survey. The first two paragraphs are again quoted, for clarity.

'In principle it was intended to undertake an interdisciplinary study of a specific area, to examine its ancient and modern topography, its present and its past botanical material, the chemical and mechanical construction of its soils, its hydrological and erosional history and the extent, distribution and dates of its ancient sites. The aim of such a study would be to provide a background, in depth to the ecology and positioning of archaeological sites in the area, to try to understand their inter-relationship and their economic potential.

'The Tell Fara region was chosen for a number of reasons: a. It lay in a truly marginal area of agriculture. As such minor fluctuations of climate or local problems of land utilization would have a critical effect upon Neolithic and post-Neolithic man and undoubtedly have affected the usage of the area by pre-Neolithic populations. b. It is dominated by a major Bronze Age site, but earlier sites in the form of Chalcolithic, and later in the form of Roman and Byzantine, have previously been reported; even prehistoric material was suspected by people such as Petrie who had recovered handaxes from the wadi. c. Geologically the area was interesting as part of the wadi drainage system, and afforded opportunities for study of the stratigraphy of geological material and the construction of terraces. d. Botanically it would be possible to make a collection of material both of the wadi flora and of the semi-arid zone. Only time of year here would affect the result.'

The continuance of the survey in '73 was intended to investigate more closely the various problems and questions raised by the '72 season.

Archaeology

A series of soundings during '72 led to the finding of material of the Byzantine period and also of the Middle Palaeolithic period. A sounding on the tell had proved rather uninformative.

This season the aims were twofold:

a. To intensify the site survey of the area in order to discover if possible a fuller range of sites by which the environmental evidence

might be more continuously dated.

b. To excavate Site B, the Mousterian site, as a special case. Site B, sounded in '72, should be capable not only of providing vital evidence on the Mousterian open usage of the Western Negev, but also it might act as a terminus for the environmental evidence and provide bone, charcoal, seed and pollen remains of a datable age.

The aims have been realised and surpassed, allowing a new series of questions to emerge. The site survey was greatly extended, though not yet complete. The information gained was rather more about rather less; in fact two periods, the Mousterian and the Chalcolithic predominate to the almost total exclusion of the remainder (see Appendix A).

Regarding Site B, a full excavation was mounted over an area 7 m x 10 m. with the hope of exposing a floor. In the event, the site has proved too rich, too extensive and too important to be dealt with in one season. There is now no doubt that there are at least three well-stratified floors, clearly defined, each separated by some 20 cm of loess. Probably other floors are present also in a lesser condition but these three seem especially rich - bone, charcoal, artifacts and lithic waste occurring in a 6-7 cm depth with intense complexity. In the few metres excavated, hundreds of objects appeared in the upper part of one floor only. The importance of this site, coupled with the difficulty and slowness of excavation, has meant postponement of any removal of material until suitable facilities, e.g. a roof, can be provided.

Entomology

A collection of non-vertebrate specimens from the Fara area was made which is intended to act as a reference collection for further work. Already insect remains have been recovered from the soil samples processed through the froth flotation cell, and this is encouraging for future work.

Botany

Continuing the work of last year, collections were made of secondary woods so that charcoal samples from Sites B and K can adequately be compared with the modern situation. These should help to give a clear indication of the local flora at Fara. In addition, the pollen evidence now beginning to appear should eventually give a total spectral appraisal of the Fara area from Mousterian times onwards. Many samples were taken for pollen analysis.

The froth flotation cell, used experimentally this year, has proved very effective for the local deposits. Seeds have been recovered from the Mousterian levels and will be examined in London. This method will be used in field conditions in the coming season, since the efficacy of using the machine for environmental research on archaeological and non-archaeological deposits alike has proved successful. As mentioned in the appendix, the isolation of pollen in the flotation process may prove to be, after

careful checking, a new and useful method of recovery.

In the overall picture, the survey is still in its early stages. To provide a well-proven and sound conclusion will take some years longer. The field work alone is incomplete, archaeologically as well as environmentally, and the laboratory backup work is still in its infancy. Already the picture has changed from last year and a great deal of progress has been made. But at this preliminary stage it is dangerous to speculate what the final conclusion may be.

Site Survey

The site survey of the 1973 season increased and reappraised the work of the '72 season. The impression gained in '72 was of the vast wealth of material concentrated within the area. '73 served forcibly to reiterate this impression. (The term 'site' indicates a location of material and does not imply nucleation or stratigraphic intensity.)

Palaeolithic

By far the greatest amount of material belongs to the Middle Palaeolithic period (Levallois-Mousterian). A number of 'Clactonian' flakes, heavily rolled, were picked up on the wadi floor. It should also be noted that there is a wide scatter of Upper Acheulean material around Kissufim, 12 km further NW along the Wadi Ghuzzeh (Ronan, A., Gilead, D., Shachnai, E. and Saull, A., 1972, Proc. Amer. Phil. Soc., Vol. 116, No. 1). Nothing has so far been recovered in the Fara area.

Middle Palaeolithic.- Sites B, D, E, F, H, K. As was realised in '72, the material of the Levallois-Mousterian period is present in quantity within the Fara area. The increase in information during '73, both in density and distribution, was considerable. Material was found on both sides of the wadi; in the badlands on the right bank every gully seemed to exhibit a scatter of newly exposed flakes emanating from near the base of the loess at more or less the same height. On the left bank, where the fossil dunes undulate beneath the loess, the same type of material is found at differing heights in association with small patches of residual loess.

The impression therefore is that during this period the area was extensively used so that over the whole 3-4 km section of the wadi examined very few areas are free of scatter of this material. A notable exception is the area of fossil dunes on the left bank N and W of the tell, where not even a vague surface scatter could be detected.

Upper Palaeolithic.- The dearth of Upper Palaeolithic material is as noticeable as the plethora of the Middle Palaeolithic. Despite fairly intensive ground survey, very few indications of this period were evidenced. No concentration was found, and it was not possible to identify even isolated artifacts with any certainty. Upper Palaeolithic material has been seen in the region near Seelim, some kilometres SE of

Fara (Ronan, A., Yossef, B. and Perrot, J., (1967), Une station Kebarienne de Negev, Le Point 104, B.S.P.F., 64, 261-278).

Mesolithic and Neolithic

Very little evidence of any use or occupation of the area was found of these periods. Occasional pieces from the surface might possibly have been assigned to them, had there been overwhelming supporting evidence, but lacking this the area might be called sterile.

Chalcolithic. Sites G, I, J, L, M

While Chalcolithic material has always been known to be common around the Wadi Ghuzzeh, in the immediate vicinity of Fara in '72 it proved somewhat elusive. More intensive surveying has redressed this position. Petrie found Chalcolithic sites throughout the wadi but unfortunately these were never mapped. Those investigated by Perrot have, at least in part, been surveyed. The only site in situ is Site J; the remainder vary from large disturbed areas to mere indications of Chalcolithic. The sites are found invariably on the country surface and residuals thereof. This is in contrast to the Mousterian sites as they now appear. Chalcolithic sites occur on both sides of the wadi. They seem to be associated with loess, not the bare fossil dunes and, according to Petrie, many are just below the country surface and covered with 100 cm or more of loess.

Bronze Age. Site A

Apart from EBI sites several kilometres downstream at the Shellal Bridge (Petrie's Site H) which stand on residual pinnacles of the country surface, no EB material is evidenced at Fara. The MB and LB periods are still dominated by the tell, a nucleated site. No further evidence was found.

Iron Age

Once again the tell, a nucleated site, is the only concentration in the area. There are said to be satellite sites within 2-3 km of the tell, but none were found within the surveyed area.

Hellenistic and Roman

Apart from the tell and the Roman revetment, only odd pieces of Roman pottery were periodically found. Once again the occupation seems restricted to the tell.

Byzantine. Site C

This period was seen during '72 through the farmstead on the right bank on the country surface. From the pottery it had been dated to mid-6th century. Apart from this one area, Byzantine sherds did, from time to time, turn up but never concentrated. It seems that at least in the immediate vicinity, this farmstead stood alone, though it is in fact only one in a whole network of Byzantine occupation of the S coastal plain. The silt dams in the gullies below C, which in '72 were thought to be contemporary, have now been updated. This does not, however, deny the possibility of Byzantine silt dams.

Islamic/Ottoman

Apart from isolated mediaeval Arab sherds, the majority of evidence comes from the last two or three centuries. The seven or eight silt dams which were noted during the two seasons, thought at one time to be Byzantine, are now thought to be relatively recent. The large dam N of the tell on the right bank produced one mediaeval sherd in situ. Further, the proximity of these dams to ruined Arab houses is now seen to be significant. It seems that the Ottoman administration, in an attempt to quieten the local Bedouin, resettled families of Egyptian fellahin in the area. It is to this period, c. 100 years ago, that the houses and probably the silt dams are to be assigned. Quantities of Gaza Black Ware have also been noticed around the dams.

Post-Ottoman

The military debris and earthworks of the Mandate and post-Mandate period are still a disturbance factor.

Topography of Sites

All heights and positions given with reference to Trig Point 121 m on Tell Fara.

A. West face of Tell Fara 80 m ESE of tell summit. Excavated during 1972 (see report) to ascertain tell/dune stratigraphy. No further investigation intended.

B. Right bank badlands 750 m ENE of tell. Approx. height 85 m. Excavation of this site, which was sounded in '72 was begun in '73 (report follows). It proves to be a rich and stratified Levallois-Mousterian site. Prior to excavation a surface locus, F73 B 010, was collected as the remnants of the F72 B 01/20 loci. Since this material is quite probably the result of the erosion of at least three horizons, its homogeneity cannot be guaranteed.

C. Right bank, on country surface. 1150 m ENE of tell. Height 96 m. This site, sounded and sherded in '72, was completed. It proves to be the badly eroded remains of a Byzantine 'farmstead' with only one subterranean cistern now in situ. From the pottery (see elsewhere) the occupation dates from the mid-6th century, the period of Justinian. No further work was conducted, though several sherds have been submitted for thin-section analysis.

D. Right bank, badlands, 750 m ENE of tell 25 m N of Site B. Approx. height 85 m.

In a similar gully to that of Site B at the base of a residual loess pinnacle. Material was exuding over an erosional bench in considerable quantity, both flint and bone; this resembles the B surface locus of '72. F73 D 010 was a total surface locus of flint and bone on the south side of the pinnacle, north side of the gully. Slight soundings failed to find in situ material, though this must be Present and should be levelled in a future season. The material is Mousterian and shows no distinction with the B material. It is presumed to be part of the same Mousterian bench as

B, now cut through by the gulley running E-W between the two sites.

E. Left bank, fossil dunes, 600 m SE of tell. Height 88 m.

The surface scatter is in an open area near the base of the fossil dunes around a slight headland. Although the surrounding deposit is dune material it is important to note that there is a very thin residual loess area from which the material appears. The degree of patination shows that it is relatively recent in exposure.

F73 E 010. A surface locus for collected material. The site has a rich scatter, which although Mousterian, gives the impression of being a rather different assemblage from that of B. By observation there are a number of tortoise cores in the collection - artifacts which are so far lacking at B. A significant point about Site E is that being on the left bank it confines the wadi which would not therefore have meandered very much in post-Mousterian times.

F. Left bank, on top of fossil dunes. 450 m SSE of tell, height 99 m. A very important group of material of Mousterian date, of which the stratigraphic position is extremely complex. The height of 99 m is some 11 m higher than any other Mousterian material, the remainder all falling within a 3-4 m band. The material is found in two parts: flints are found in a wide and thin surface scatter over the surface of the upper dunes. This material is very heavily patinated, implying long exposure, but it shows no sign of rolling. Flints are also found, unpatinated, in conjunction with a small residual loess peak on top of the dune.

This is not the only dune surface where material was noted. Westwards, towards the tell, small scatterings of Mousterian flints were seen, even extruding in the tell debris. It is not unlikely that there may be a scatter of Mousterian directly beneath the tell, on the dune material.

G. Right bank, on country surface, 1000 m NE of tell, height 101 m. A large area of material on and around the edge of the country surface and 'lowered' in the gullies cutting back the surface. The material is basically of Chalcolithic date, though earlier and later material is mixed in with it.

F73 G 010 surface locus, combining all the main Chalcolithic type fossils -- bitruncated denticulated sickle blades, hogback hoes, heavily gritted sherds, etc. Not all the material was taken. There were also many conglomerate querns and several polished limestone mortars. No in situ deposit was discovered, although soundings were made. A misleading feature in this area is a number of concreted pans just below the surface which seem at first sight to be plaster floors, but which underlie the whole country surface.

The headland which is now designated G was examined last season. It is the site of what were thought to be Bedouin burials, and rich Chalcolithic material, sometimes even appearing in the talus from the washed out graves, was too suggestive to be ignored.

F73 G 11. The soundings of an almost totally eroded burial to ascertain its date and grave goods. 223 cm W of BWNE trig point 109.

The grave was cut from the country surface as a trench 110 cm deep, 300 cm wide and at least 76 cm long. The body, that of a child of 6-7 years max. height 70 cm, had been laid on its side, arms straight down the front of the body and head on one side facing west at the N. end. The grave was backfilled with soft loess to a depth of 35 cm (65 cm from surface). A cist was then created by placing large flat stones over the grave, and the whole then backfilled to the surface. No grave goods were found; the burial style, a very distinctive one, is so far uncomparred. There are many others of the same type, many of which are young burials. Lacking further evidence, they are probably Bedouin, though the possibility of an earlier date cannot be ruled out.

H. Right bank badlands 800 m ESE of tell at several heights, but mainly 87 m.

A liberal scatter of flint debris in several ravines in the area, H being only one of a number.

F73 H 010. A surface collection at the base of the badlands scarp. The scatter was considerable over about 400 sq. m and particularly over an area of 12 sq. m near its source. The stratified horizon of extruding material was found, but though in situ it is unlikely to be a primary deposit. No charcoal or bone was found. The loess showed distinct patchiness and waving. This site, or area, once again Mousterian, opens up a new area of Mousterian material further upstream than the B/D area.

Right bank, below the country surface 1050 m NNE of tell. Height 97 m.

This is a junction area between the fossil dunes and the residual loess in an eroded headland. Large scatter of waste flakes and undiagnostic chipped stone.

F 73 I 010 surface locus over 1000 sq m on country surface and in outwash gullies. One or two Chalcolithic hogback hoes, very few blades. The pottery was sparse, mainly coarse ware, heavily gritted with tiny pebbles. This scatter, largely Chalcolithic, was not traceable to any in situ deposit.

J. Right bank on residual country surface, approx. 1000 m. N of tell at a height of 97 m.

F73 J 010. A large surface area of surface debris on a bench overlooking the wadi. Hogback hoes, sickle blades, polished limestone, fan scrapers, piecrust rims, etc., were all noted, though not in situ.

F73 J 020. Surface locus 200 m N of J 010 Bearing 32' from tell. A scatter from an insitu deposit recognised 70 cm below the country surface. This site is well back on the country surface, but on the edge of an erosional gully behind the wadi headlands. All the standard type Chalcolithic type fossils were present. In addition a number of fine-ware pieces were collected, some with red slip and burnish. No evidence of EBI was otherwise noticed.

K. Right bank in badland gullies 1000 m ESE of tell and 175 N of wadi.

Height 92 m.

This area is near H, but higher than it and also not as productive in surface scatter.

F73 K 010. A small group of surface flints from an area of 50 sq. m Mousterian in type. They represent an extremely important addition to the survey being very high in the loess sequence.

F73 K 111. Directly above the surface scatter an in situ deposit was noted, being very rich in bone and charcoal. In one area, a hearth was already visible, with the reddening of the loess and bands of ash with considerable amounts of fragmented charcoal. Strangely, in comparison with the richness of this material, much richer even than the charcoal at B, it was only after some time that any flint was exposed and even then only two small isolated pieces, both undiagnostic.

The importance of assessing the date of this layer is heightened by the fact that for the first time it is apparently stratified directly on top of a very thick palaeosol, and some distance beneath another. The singular distribution of flints on the surface and lack of flints in situ means that one can only assume a Mousterian date for F73 J 111; it cannot be proved, yet the potential for dating the stratigraphy of the loess in this area is greater than anywhere else. Charcoal samples were taken for analysis, but further work in a future season is imperative.

L. Right bank badlands. 75 m N of K. Height 101 m.

This is an isolated residual (an outlier) from the country surface (no height). A small collection, probably Chalcolithic, was noted here. The potential of L, being so near K, is the localised completion of stratigraphical column from Mousterian to Chalcolithic.

M. Left bank on country surface approx. 2 km upstream of tell.

A very large area scatter of Chalcolithic material well back (200-300 m) from the edge of the country surface, apparently newly exposed by deep (30 cm) ploughing. The site had long been visible and was visited some years ago by J. Perrot.

F73 M 010. A collection of surface material. A very large number of blade cores were found, some fan scrapers, a few blades and hardly any pottery. Polished limestone mortar fragments were also noted. No in situ deposit was looked for - the chances of finding one seem rather poor.

N. Right bank in gulley near N spring. 1100 ENE of tell, 175 m N. of B. Height 84-88 m. A small, high level gravel bed, probably of a stream which ran eastwards and northwards under the residual loess. This bed is very localised.

F73 N 010. A surface collection from gravel outwash - ? Mousterian.

F 73 N 020. In situ artifacts from gravel bed. The artifacts show slight polishing by water action but no heavy rolling. They are obviously in secondary deposition among the gravel and sands which might have been washed from a fossil dune now no longer visible. No interpretation of these artifacts is yet possible, but it is possible that N might prove to be of an intermediate date in the loess sequence.

APPENDIX A

Site Distribution and Settlement Pattern

Of the 14 sites investigated either in situ or as surface scatter, a notable feature is the obvious polarization of periods. With the exception of A, the tell, C, the Byzantine site and N which is so far undated, the remaining 11 areas are either Mousterian (six sites) or Chalcolithic (five sites). Neither are these the sum total of occurrences of these two periods - they are simply those sites most obvious. Equally noticeable, however, is the apparent lack of Upper/Epi-Palaeolithic, Mesolithic and Neolithic material.

The distribution of the two periods in evidence is clearly defined. The Mousterian sites in general are found no further than 100-200 m from the present course of the wadi, on both sides. One explanation of course would be that the geometry of erosion has only revealed the lower loess levels close to the wadi. A more attractive interpretation would be that they are placed on a terrace close to the wadi as it now stands. A second feature of this interpretation is the obvious focus of these sites around present-day springs or seep lines. Such a naive conclusion, that the wadi bank and the spring have been in more or less the same location for the last 70,000 years or so, would demand very careful proof of the longevity of the present erosional pattern - a fact which may indeed be emerging from the geomorphological evidence.

A further distribution factor which may or may not be relevant is that these sites occur near the 100 m contour line (average 90 m). Insufficient upstream and downstream site surveying renders this latter concept somewhat unproven, but it might be borne in mind for future study.

Combining these points, one could imagine Mousterian hunters utilizing the wadi banks but no more than 10 m above the available water and concentrated perhaps around water holes. In this setting the butchering of animals might have taken place along with the manufacture of cutting tools. There is still the possibility of subsidiary or even major living areas being found elsewhere, away from the wadi, but what would surely have been the overwhelming attraction of the wadi to hunter-gatherers makes this seem unlikely.

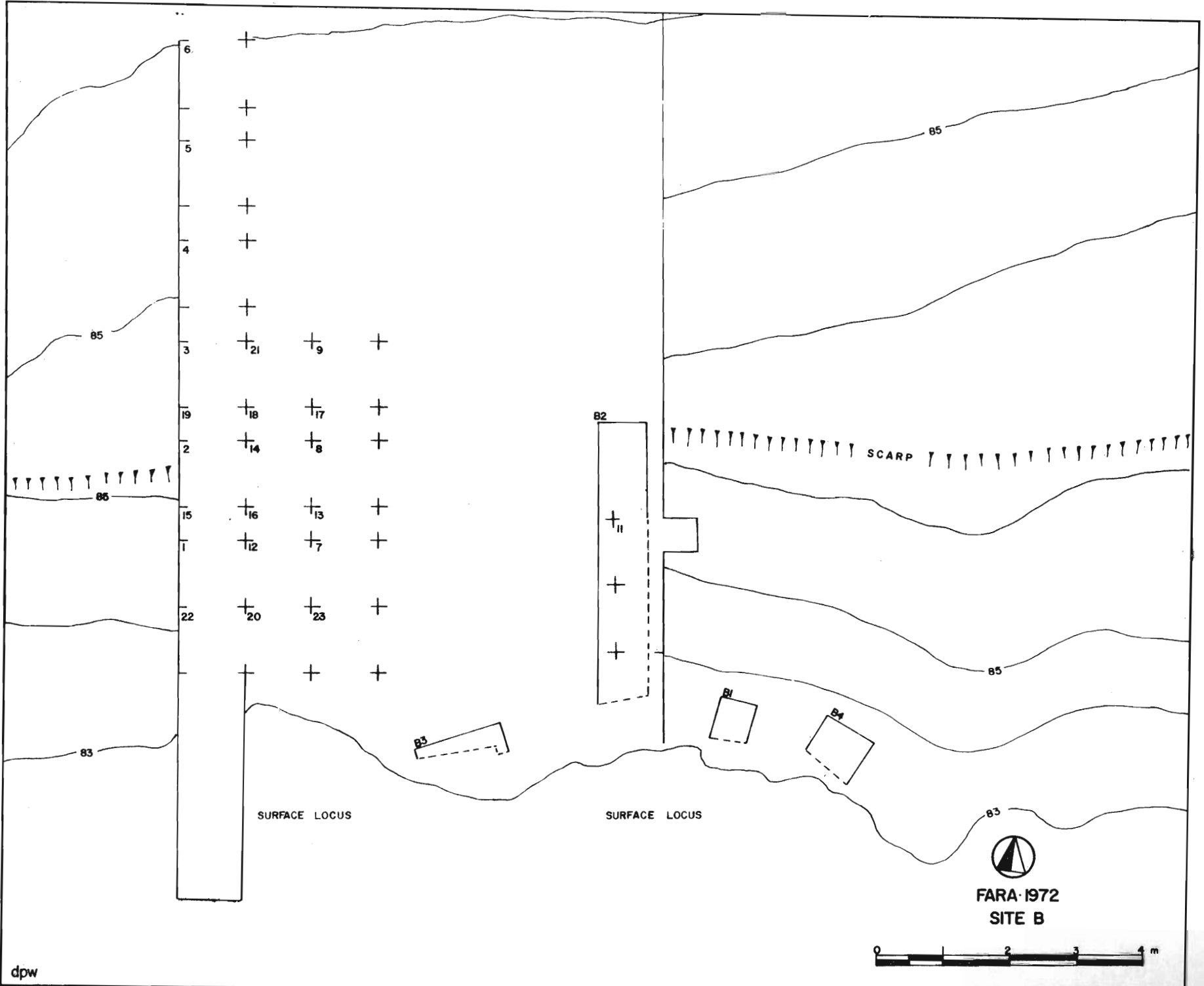
In contrast to that pattern, the Chalcolithic food producing economies seem to demand different siting. The five so far surveyed together with those examined nearer the Shellal Bridge, without exception stand on or near the country surface (101 m). Not only this, but they can be a considerable distance 'inland' - up to 300 m or more from the headland edge and as such as much as 1000 m from the wadi. Also, the access from the wadi to the sites is often over difficult badland terrain. It is tempting to see this distribution pattern as a clear result of agricultural requirements, that is that settlements were naturally focussed upon the growing areas, not upon water supply which must incidentally have come from

the wadi. As with all the Wadi Ghuzzeh sites, it is assumed that none of the Chalcolithic sites are permanently and continuously occupied, hence their non-nucleated appearance on every headland. One would think in occupations of years rather than centuries. As Petrie et al. have already demonstrated, each site is typologically different, implying periodic use over a long time. Nothing in the '73 survey disproves this.

The picture may emerge of two far distant periods, demanding two different patterns. The greatest difficulty is to explain the apparent lack of material between the Mousterian and the Chalcolithic, a period which may be as long as 35,000 years.

With regard to the almost total absence, at least in the Fara area, of Upper/Epi-Palaeolithic, Mesolithic and Neolithic material in comparison with the richness of the Middle Palaeolithic and Chalcolithic periods, the most likely explanation is indeed a total lack of utilization of the area during the time. There are certain points that should act as riders to this interpretation, however. If Upper Palaeolithic sites were distributed close to the wadi, but higher in the loess, the erosional geometry which now exposes the Mousterian sites would probably have truncated or obliterated any trace of these later periods. It is fair to say on the other hand that hardly one artifact has ever turned up from the Upper Palaeolithic and one surely would discover some vestige, lowered or otherwise, of that material had it ever been present. The conclusion to which, on present evidence, we incline, is that the area was not occupied during this long period.

A second factor of this unoccupied period emerges when it is realised that the Mousterian levels are very close to the base of the loess, and the Chalcolithic levels are immediately below the uppermost strata of the loess. If it is correct that the loess deposition is thus bracketed between the two, then it is apparently true that the period of loess deposition coincides with the period of lack of occupation. Quite what this coincidence might mean is an intriguing subject for further research.



dpw

FARA 1972
SITE B



APPENDIX B

Site B

The following is a preliminary statement on the soundings made at Site B (see Site Survey) during 1973.

This site was first identified during the 1972 season (Price Williams, 1973). It was decided to extend the 1972 soundings at B for three reasons: firstly, recent erosion is rapidly exposing more of the undisturbed material of the deposit; secondly, it was known that there might be sufficient mammalian and floral remains, in the form of bones, pollen, charcoal, seeds, etc., to act as a well-documented terminus for the environmental survey which was the object of the expedition; and thirdly, if the loess column above this site, rich as it is in environmental evidence, is to be of value then it is essential fully to understand the relationship of the lower loess to the archaeological deposit.

From previous investigation, the deposit or deposits were known to lie in a restricted area beneath a residual E.-W. loess escarpment bounded to the north and south by gullies which have truncated the deposit on these two sides so that a 10 m. width survives (see Plan). The east-west extent is not known, but has been traced along the scarp and is known to exceed 20 m. The overburden of the loess escarpment varies from 2.5-3.5 m, believed to be a fraction of its former thickness of about 16 m. It should be remembered that the northern and southern limits of the deposit are due to recent erosion, and are not therefore necessarily due to any contemporary nucleation of the Mousterian material; in other words, the deposit would seem to have extended much further at one time, but the terrace on which it lay had first been covered in loess and then recently dissected.

Method

The 3 m overburden was removed in an area 7 m E.-W. across the 10 m wide escarpment, leaving two vertical sections 10 m long on the west and east faces of the exposure. The depth of the cut was determined by the height of the material found in F72B3, with a safety margin of 25 cm. This overburden was assumed following the step trench F72B2 of last season to be sterile. The total area available for sounding was thus 10 x 7 m, of which only selected areas were used for sampling the deposit. Within this rectangle an area 15 sq m was exposed in the S.W. part (20, 23, 22, 1, 12, 7, 15, 16, 13, 2, 14, 8, 19, 18, 17, 3, 21, 9). Four further 1 m squares were opened north of this area to trace the northernmost extent of the spur (4, 5, 6, and 10). A third area in the S.E. corner, under the F72B2 step trench, was opened for the same reason.

The evidence of the 1973 season can now be combined with that of 1972 to give a fairly clear indication of the nature of the site. It must be stressed, however, that since excavation has been minimal, final confirmation must await further research.

Results

It is now clear that Site B is a well-stratified Mousterian open site, probably one of a whole system or area of similar sites exposed residually along the sides of the wadi in this vicinity. At B there are certainly three well-defined floors in sequence extending over a considerable distance; it is equally certain that in the area sounded at least four lesser deposits interleave with the three main floors, bringing the total at present to seven within a 5. cm deposit. The vertical references have been made accessible by the soundings and by the natural erosion of the escarpment. The horizontal extent, however, can only be understood by more intensive excavation.

(Note; all heights are given in m. above sea level.)

Floor 1.-- Height c. 84.00 m (taken as datum). Thickness 5-6 cm. This floor was exposed over the whole of the 15 sq m area in the S.E. corner of the site. Apart from isolated pieces, this is the highest deposit at B. It consists of an extremely rich assemblage of bone and flint with a liberal admixture of charcoal. It lies on compacted ash or loess to a depth of 5 cm on a hard trampled floor, and the whole is overlaid by many minute wavy layers of water-sorted loess, similar to those layers seen in animal puddling. From the charcoal found intact and the unweathered though broken bone, there can be little doubt that the deposit is in situ and undisturbed.

Floor 2.-- Height c. 83.74 m. Thickness 4 cm. Floor 2 is the main floor seen in the sounding F72B3.1.1 and also in F73B11 and in a scarp exposure south of F73B12.

No part of this floor has been fully examined, but the layer seems rich in flint, bone and charcoal. As far as can be ascertained from the very small lithic sample, there is no immediate evidence to suggest any typological difference between floors 1 and 2.

Floor 3.-- Height c. 83.54 m. Thickness c. 3 cm. Floor 3 has been seen in F72B3, F73B11 and possibly in F73B3 (locus 1, layer 2). No material here has been more than glimpsed, but the layer seems to be very rich, particularly in charcoal. No typological distinction can as yet be seen.

To complete the stratigraphy of Site B, the intervening layers between the floors are of loess, largely sterile but with occasional lenses subdividing them. The whole pattern of B therefore illustrates an extremely rich, well-stratified open Mousterian site, one of a number of such deposits around the wadi at Fara. It is presumed that this area of a large terrace along the edge of the wadi was intermittently utilized as a butchering site.

The 1973 season must be seen at B to be no more than a preliminary investigation. A small part of Floor 1 only was exposed, which proved to be so rich and complex as to demand very careful excavation and removal. It was felt that with the time available, the interests of the site would be

better served by postponing the investigation; the exposed area of Floor 1 was therefore carefully covered and backfilled to await further work.

Chipped Stone Industry

Nothing so far seen at B has been contradicted by this year's findings. The surface collections of last season and this season, F72BO.1.0, F72BO.2.0, and F73 BO.1.0 are clearly homogeneous in character; they too must represent material from all the floors, being washed out on the erosional bench to the south of the spur.

"The lithic material is mainly of blown flint, the raw material being locally available wadi cobbles, since tabular flint was not found. The cobbles, of banded flint and chert, have no true cortex but a battered and rolled surface . . . The flakes and blades are still extremely sharp; no sign of patination was observed . . ." (Price Williams, 1973).

As with the 1972 material, the artefacts are mostly Levallois flakes, the next most common type being the cortex-backed knives. Some of the most common pieces are Levallois points which were well made, and some exhibited "chapeau de gendarme" butts. Retouching of the artefacts seems rare, and large tools and cores are surprisingly almost absent.

Publication of the material is imminent.

Mammalian Remains

The large quantity of bone evidenced in 1972 is certainly verified by the 1973 season. Though partly mineralized, the bone is in remarkably good condition. Fragments were usually broken longitudinally, but there was ample evidence of latitudinal breaks and even cuts in the bone. The size of the fragments varied from tiny slivers to pieces up to 12 cm in length. A number of articular surfaces were present, and in one case an extremely badly preserved scapula was noted.

Since none of the bone has been removed but now lies beneath the backfill, no firm diagnosis of species can be given. Certainly a number of large-diameter bones, similar to Bos, were seen. This identification, crucial to the environmental survey, will await further excavation.

Floral Remains

Small quantities of charcoal have been removed during the 1973 season for analysis of secondary woods of the period in that area. For the retrieval of smaller remains, a stratigraphic soil column was cut 50 cm sq in the section adjacent to F73B11 (see Plan). This material was processed in a froth flotation cell and has yielded both seeds and insect remains which await laboratory tests.

APPENDIX C

Preliminary Report on Geomorphological Aspects of Work

During three weeks of field work attempts were made to confirm the general stratigraphical sequence recorded last year, to make a closer examination of the erosional and depositional traces, especially around Site B, and to examine the morphological and stratigraphical position of a number of new sites.

No evidence has emerged to contradict the overall pattern of deposition reported last year. A number of minor amendments might be made, however, and it is certain that the erosional history of the area is more complex than had been appreciated and that considerable time and effort will be needed to understand it. It was noticed that in two areas, one immediately underlying the tell and the other in a right-bank side wadi some distance to the north, the fossil dunes promontories are underlain unconformably by beds of softer unbedded orange sand. These have the appearance of beach deposits and accord well with the supposition of coastal, regressional dunes associated with a retreating sea level. Evidence from other areas places this sequence in the Late Pliocene or Early Pleistocene. There are too few exposures for the relationship of the sands, dunes and pebble beds to be clear, but the theory that the pebble beds underlie and in places interfinger with the finer material remains tenable.

Again the depositional pattern of the overlying aeolian deposits is clear enough: they infill the hollows between the promontories and often lie as a comparatively thin stratum over the promontories themselves. They appear to be almost horizontal in a N-S direction, but this appearance must be treated with some reserve. The most strongly marked horizons in the series are concretionary and weathering horizons (avoiding for the moment the vexed question of whether the weathering horizons are truly 'soils') and are therefore secondary to the loess deposition itself. Unfortunately, there are, because of the nature of the country, few long sections exposed in an E-W direction, i.e. at right angles to the wadi. This lack makes it unwise to speculate at this stage about the relationship between deposition, subsequent concretion and pedogenesis and the contemporary position of the wadi - a matter of importance in understanding the position of early sites in the area.

Another depositional feature of interest was noticed with the loess. At its base, in the region behind the tamarisk grove at the N spring, there is a band of cobbles 20-50 cm in thickness dipping to the E, that is away from the present wadi. Not only is this band well above the underlying pebble beds, but it lies on loess. The most likely explanation is that it marks an eastward sweep of the wadi at an early depositional stage of the loess.

The erosional history of the area is perhaps of greater archaeological interest as well as of considerably greater complexity. In last year's report it was stated that no infilled ancient erosion channels had been

located. Closer examination this year showed that such channels are present, although rare. Two such are of particular interest. One runs approximately E-W in the levels immediately above Site B and another in slightly higher levels some 150 m N of Site B. The channel above Site B is infilled with coarse sand and grit mixed with silty material, while the other one contains bands of well-graded rounded gravel. The former course of these stream channels is not yet certain but the nature of their infill suggests a source on the sandstone outcrops to the N or E and therefore indicates that there were no major erosional features cutting off the area, and therefore Site B, from the country surface. The second channel (Site N) is also of interest since it contains worked flint in a lightly rolled state, although the number of artifacts is too small for any positive identification of period to be made.

The discovery this year of two new Chalcolithic sites, together with the identification and examination of several previously excavated ones, enables a closer date to be put on the main period of loess deposition. These sites appear to be on or near the present-day country surface (clearly it is important to know which it is - but this must await further investigation) so that the main bulk of the loess must have been deposited by Chalcolithic times. Workers in the region think it likely that aeolian deposition has continued from mid- or early Pleistocene times up to the present day. The existence of these sites, however, at roughly the same stratigraphic position as both Site C, the Byzantine site discovered last year, and the present-day country surface, indicate at least a considerable slowing down of deposition since Chalcolithic times. The beginnings of deposition on present showing lies at a few metres below Site B and so far no evidence has emerged to indicate an earlier origin. This matter is of such importance, however, since a chronological bracketing of the loess would be of more than regional interest, that a more thorough and intensive investigation seems justified. The lower levels of the loess in the area of Site B are not only greatly dissected by linear erosion, but also extensively masked by washed down material and the whole group of gullies and residuals is cut off from direct connection with the country surface by a larger gully running SE-NW. In order to be absolutely sure of the stratigraphic position of Site B therefore, and to confirm our belief that it lies on a depositional feature and not on an erosional one, it will be necessary to clean down and map a number of overlapping sections running back up to the country surface. In the chaotic morphology of the badlands this is a considerable enterprise which might involve two or three people for the major part of next year's season. If stratigraphical certainty can thus be assured, however, the investment would be amply justified.

The location and relationship of the various sites is reported on in detail elsewhere: but it might be profitable to comment briefly on their position insofar as it throws light on the morphology and history of the regional deposits.

Sites B, D, H and K all appear to lie within the lower horizons of the loess on the right bank of the wadi. There is a difference of some 7 m in elevation between B and K, but making allowance for the general fall of the country and for the probable inequalities of aeolian deposition this difference does not seem excessive and all four might be considered to fall within the same depositional phase. Archaeologically, of course, it is to be hoped that the height differences will prove to reflect chronological ones, but this must await excavation and comparison of the artifacts. Certainly no such supposition can be safely made from the morphological evidence.

The discovery of Sites H and K reinforces the impression, mentioned in last year's report, that there has been little lateral shift of the wadi since mid-Palaeolithic times. Assuming that the wadi existed at all - and the distribution of sites makes very little sense unless this assumption is made - its course must have lain within the 500 m band between Sites B and K on the right bank, and the tell on the left. The height of the wadi at different periods is a more problematical matter. On the evidence, mentioned last year, of the Roman revetment wall running along the base of the tell, there has been little vertical movement since those times. The only firm evidence for earlier levels lies with the cobble band, mentioned earlier, below Site H. The cobbles might be taken to indicate a wadi bed level rather than just a high flood, but even so they are barely 5 m above the present bed, a very modest difference considering the lengths of time involved. Again, in periods of lowered sea levels, and therefore of lowered base level, the wadi might have lain beneath the present bed, but although the bed might have been scoured and refilled at Fara, where it is composed of cobbles, a little farther downstream towards the Shellal Bridge it runs over sandstones and conglomerates which appear to be of marine or littoral origin. In other words there is very little room for vertical movement either. There remains the possibility that the wadi bed, perhaps during a period or periods of high sea level, might have risen on a bed of alluvium, much of which would be carried away during subsequent downcutting. No evidence for such a process has yet been found, and indeed terraces of loessal silt, lying against banks of original or reworked loess, the whole being subsequently dissected by extensive gulleying, might be difficult to find, let alone prove; but the possibility must not be ignored. A final word of caution on this matter might not be out of place. The wadi, like many others in semi-arid and arid regions, has a flow which is largely exotic - i.e. it depends not on local rainfall but on rainfall in the hills to the north and east. Although it usually contains some water, its bankfull capacity - the state of which determines its size and shape - may be reached on only a few days of the year. So while the maximum flow could not increase greatly without affecting the geometry of the system, the flood frequency at or below maximum volume

would vary greatly without very much morphological effect. In other words, if the rainfall in the hills were doubled, not in intensity but in the number of raindays, the effect on the wadi shape and size might be negligible, although the effect on the flora and fauna might be profound.

The morphological evidence suggested by the Chalcolithic sites I and J and Site N has been mentioned elsewhere, but it is worth discussing briefly the stratigraphic position of the two left-bank Palaeolithic sites, E and F. Although at different elevations, both lie approximately at the junction of the dune sandstone and a relatively thin stratum of overlying loess. Heavily patinated tools have been found on flat surfaces of the sandstone, presumably either in their original position or else lowered during erosion of the surface; and other, unpatinated flint emerging from exposures of the junction. Very tentatively, therefore, it might be assumed that loessal deposition, protecting the tools beneath, occurred within a fairly short time of their emplacement. As far as can be seen, moreover, there are no signs of eroded steps in the gentle slopes between the covered and uncovered sandstone. So it appears that there has been little lowering of the overall sandstone surface since the loessal deposition.

In all, the geomorphological problems seem to multiply the longer and more closely the area is examined. This unsurprising conclusion is tempered by a parallel one - that most of them are capable of solution within the area, given more work.

APPENDIX D

Preliminary Report of Zoological Work

1. Aims and methods

The main aim was to make a survey of the immediate area around the tell and Site B. This was an area of 2-3 km sq. It was immediately decided to concentrate on the invertebrate fauna, for to make a study of the vertebrates would yield small results for a great deal of effort.

For the study of the invertebrate fauna the area was divided into a number of geographical zones. These were:

- a. The grassland slip off slopes.
- b. The fossil dunes.
- c. The badlands.
- d. The floor of the wadi.
- e. The narrow depositional strip along the edge of the wadi.

These zones follow fairly closely the botanical zones which were determined last year.

Sampling was carried out in the same way in all five of these areas.

The methods used were:

- i. Aerial netting.
- ii. Sweep netting.
- iii. Beating of the large vegetation.
- iv. Pitfall trapping.

These different methods sample a number of very different groups of invertebrates. The aerial netting catches the flying insects, particularly the larger species which are easily seen. So the groups caught are mainly Diptera, Hymenoptera and Lepidoptera, with a few individuals from other orders.

The sweep netting samples the shorter vegetation, particularly the grassland. Caught by this method are mainly the Hemiptera and Arachnida, with a number of Coleoptera and the smaller grassland Diptera and Hymenoptera. The Orthoptera are caught by both of these last two methods.

The beating of larger vegetation such as the Tamarix and Artemisia knocks off many individuals and is particularly important for those species whose natural reaction is to fall when they are disturbed. This mainly samples the Coleoptera and Hemiptera.

Pitfall trapping is a very useful method of sampling which is continuous all the time the traps are in the ground. This method collects Formicidae (Hymenoptera), Coleoptera, particularly Carabidae, and the Arachnida.

All these sampling methods, except for the possible exception of aerial netting, are random methods which are very useful for a survey such as this. The pitfall traps were placed in diagonal lines across the area to be sampled so that the maximum variation of the area was sampled with the minimum number of traps.

Insect remains obtained from deposits sampled by the seed machine

will be taken to London, where it is hoped that it will be possible to identify them. The identification of the insect collection will also be undertaken in London.

A collection of molluscs in the area was made and these will be compared with any snail shells which may be found in the archaeological deposits.

2. Results

At this stage, before any of the identification has been carried out, it is difficult to say anything definite about any of the material found. However, it is possible to make a number of preliminary observations. First, the fauna of the grassland area is very typical of a grassland fauna anywhere in the world. The two dominant groups are Auchenorrhyncha (Homoptera) and Orthoptera. In the other areas all the large insect orders were well represented with the exception of the Coleoptera. This order was found in much smaller numbers than expected. This may have been because the sampling method was not adequate for this group, i.e. the pitfall traps were not sufficiently large to retain the beetles. Second, there may be a high percentage of alate species which could easily fly out of the traps.

It is not yet possible to say which groups of animals will be important in determining the environment at the time of the archaeological deposits. The beetles may be important because much of their body is heavily sclerotized and will therefore be more easily preserved. The snails may also be important.

3. Suggestions for Future Work

It is essential that the reference collection of the present-day invertebrates as well as vertebrates be completed and therefore that some collecting should be done at night, particularly by the use of a light trap.

It is necessary to develop a method for determining whether insect remains obtained from the seed machine are ancient or modern.

Collecting should be carried out at other times of the year, particularly in the wet season, so that a more complete picture of the present-day fauna can be made.

APPENDIX E

Preliminary Report of Botanical Work

A general investigation of the 1.5 km sq studied last year was first carried out, when it became apparent that this had been a much drier season. Few wadi annuals had survived and the *Tamarix* seedling in the wadi had not been dislodged by floods. Their continued growth had caused a considerable change in the shape of the wadi floor. Away from the wadi little change in the distribution of species was noted; but very few flowers persisted, thus making any collection of modern pollens impossible. Several new species were noted and once again it was evident that any comprehensive list of plants will be impossible without a collection earlier in the year being made, in order that the genera belonging to the Graminae, one of the most widely occurring families, can be seen as accurately identified. A representative collection of both woody and herbaceous species was made in the field for the herbarium at Kew, using lattice presses.

A recent publication in the *Israel Journ. Bot.* should provide valuable information concerning tree distribution. The *Acacia raddiana* seedlings described last year are now known to be *Prosopis farcta* and it seems that although the *Acacia raddiana* may be subject to some Bedouin interference its apparent lack of success may also be due to the fact that it is a residual Sudanian species. It would therefore be tolerant of either the low temperature during the winter or the competition and repeated disturbance of the upper slopes due to ploughing.

Further work on the vegetational zoning was not carried out this year. It was felt that although this is of great ecological interest it is not strictly relevant to a general environmental project.

Since a considerable quantity of charcoal was recovered during the excavation of the Palaeolithic site, a collection of secondary wood was made from all plants in the area. Most of the trees are a comparatively recent development and it may well be that Chamaephytes provided the main charcoal source in Mousterian times. Maceration and subsequent staining of the charcoal fragments should provide valuable information concerning the structure of the xylem vessels which, in many species, is diagnostic.

Quadrating of the area adjacent to the Palaeolithic site during the '72 season had proved rather unproductive, due to the large number of dead, unidentifiable species present. This year a collection of all available fruits and seeds from the north-facing dip slope was made, so that these could be compared with results obtained using the froth flotation technique.

A detailed collection of all available seeds was also made as a direct control prior to the use of this technique. Some of these were collected last year, but it may be that considerable morphological changes

are apparent in seeds of a particular species during a drier season, since the moisture content of many seeds is quite high.

Consecutive 10 cm layers (approx 20 litres) from a 50 x 50 cm column immediately adjacent to Site B were put through a flotation cell similar to that described by Jarman, Legge and Charles (Papers in Economic Prehistory, C.U.P., 1972), in an attempt to effect a comprehensive retrieval of organic remains. This method appeared to be extremely satisfactory using the loess deposit. A number of seeds, together with insect remains, were recovered in the 1 mm and 0.3 mm granulometry sieves. These were collected by washing with a small hand spray, wrapped in pre-wetted paper towelling, fastened by stapling and allowed to shade-dry. Since the percentage retrieval of organic remains appeared to be high, it was felt that the method might be extended to include the collection of ancient pollens, a soil component normally heavier than water. Liquid from the froth fraction passing through the sieves was collected and small samples from each layer were examined microscopically, after staining with 0.50 (0.5%) aqueous safranin. Preliminary small scale investigations showed that this fraction did in fact contain ancient pollens, though further work will certainly be necessary to perfect the method and to ensure that the pollen collected is both adequate in amount and in the number of genera represented.

Although the problems of palynological work with wind-blown deposits in an area where anemophilous plant species predominate was stressed last year, one further point should be considered. Where no impermeable layers exist within a column, pollen grains may be capable of considerable movement in any direction.

Finally, since the potential of the froth flotation technique seems considerable and since it has not so far been used to any extent in Israel for the retrieval of non-cereal plant remains or pollen, it seems that co-operation with Israeli scientists would be not only possible, but of considerable benefit.

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