Archaeological Investigations at the Neolithic Site of es-Sifiya / Wadi Mujib, Jordan

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Abstract. *After the success of the previous excavations at the site of es-Sifiya,we were encouraged to conduct a very large intensive season in Area C during 1998 /1999. The goals of this excavation were to uncover more of the potential of this large Neolithic settlement, and to obtain C14 dates from stratified layers. A grid of thirteen squares 5 x 5 m. were excavated. The excavation revealed C14 samples dating the site to Late PPNB, and also revealed an outstanding preserved architectural remains of multi roomed building units, ground stone tools and stone vessels, chipped lithic artifacts, worked bone artifacts, floral and faunal remains and various artistic items.*

1. Introduction

Es-Sifiya is apparently the only Neolithic settlement that exists in Wadi Mujib (Fig.1). According to the site survey and the surface distribution of the Neolithic artifacts, the site covers an area of approximately 12 hectares (30 acres). The identified cultural layers are distributed between 150 and 230 m above sea level. Their location is bordered by Wadi Mujib in the south and by Wadi Salaytah in the north; cliffs limit the site area in the east, and fluvial deposits of the confluence of both wadis in the west. (Fig. 2)

The most extraordinary feature of the site is its excellent architectural preservation. The highest parts of the site were seemingly the most densely occupied areas; the spots close to the floodplain were less densely populated, and architectural remains may have disappeared here due to modern agricultural activities. Several fresh-water springs exist in Wadi Mujib, creating a perennial watercourse. The enormous capacity of these springs allowed permanent year-round settled life in the early Neolithic. The undisturbed habitats around es-Sifiya must have had a vast extension, and offered a diversified system: steppic grazing land, fertile farmland and perhaps open forests on the floodplains, slopes, and heights; and fringe forests and well-watered garden lands in the wadis.

The site has been under excavation since 1994. A contour map was prepared in 1994 during the initial investigations. The first excavated area chosen was a bulldozer cut that had caused considerable damage to a major domestic area of the site. From the excavation in this area, a general understanding of the site's stratigraphy was obtained. It demonstrated that es-Sifiya exclusively represents a late phase of the PPNB (second half of the seventh millennium B.C., cf. Mahasneh 1997a).

The excavations in 1995 and 1996 investigated Area A (Mahasneh 1996; 1997b; Mahasneh and Bienert 2000; Bienert and Mahasneh 1998) and Area B (Mahasneh 1998). The results of these excavations provided a basic understanding of the potential character of the Late PPNB Neolithic culture in that part of central-southern Jordan. In 1997 and 1998 large-scale excavations were carried out in Area C, situated on the slope of the wadi upper

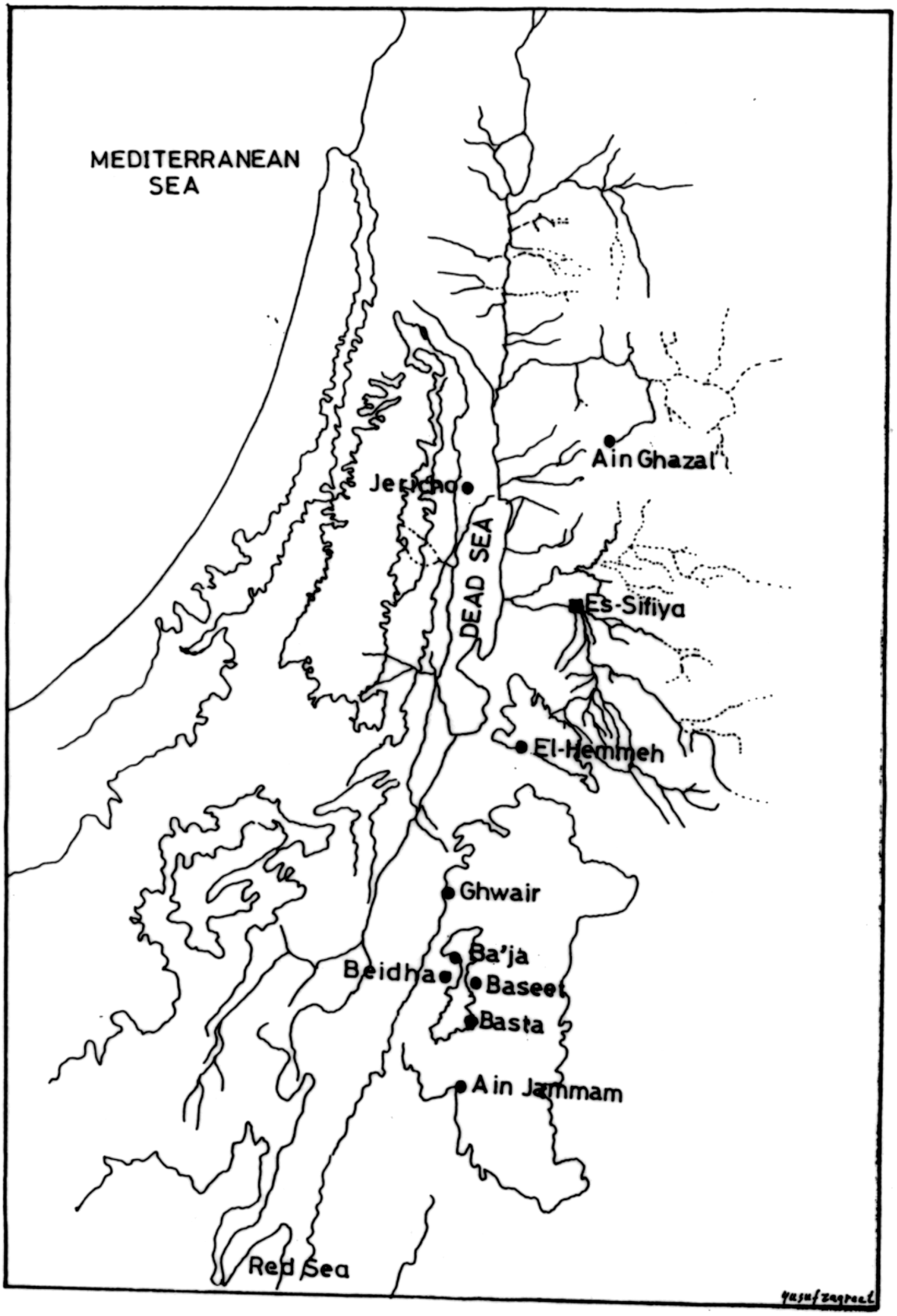

Fig. 1: PPNB Villages along the Rift Valley, expected to relate to the Megasite of the seventh millennium B.C.

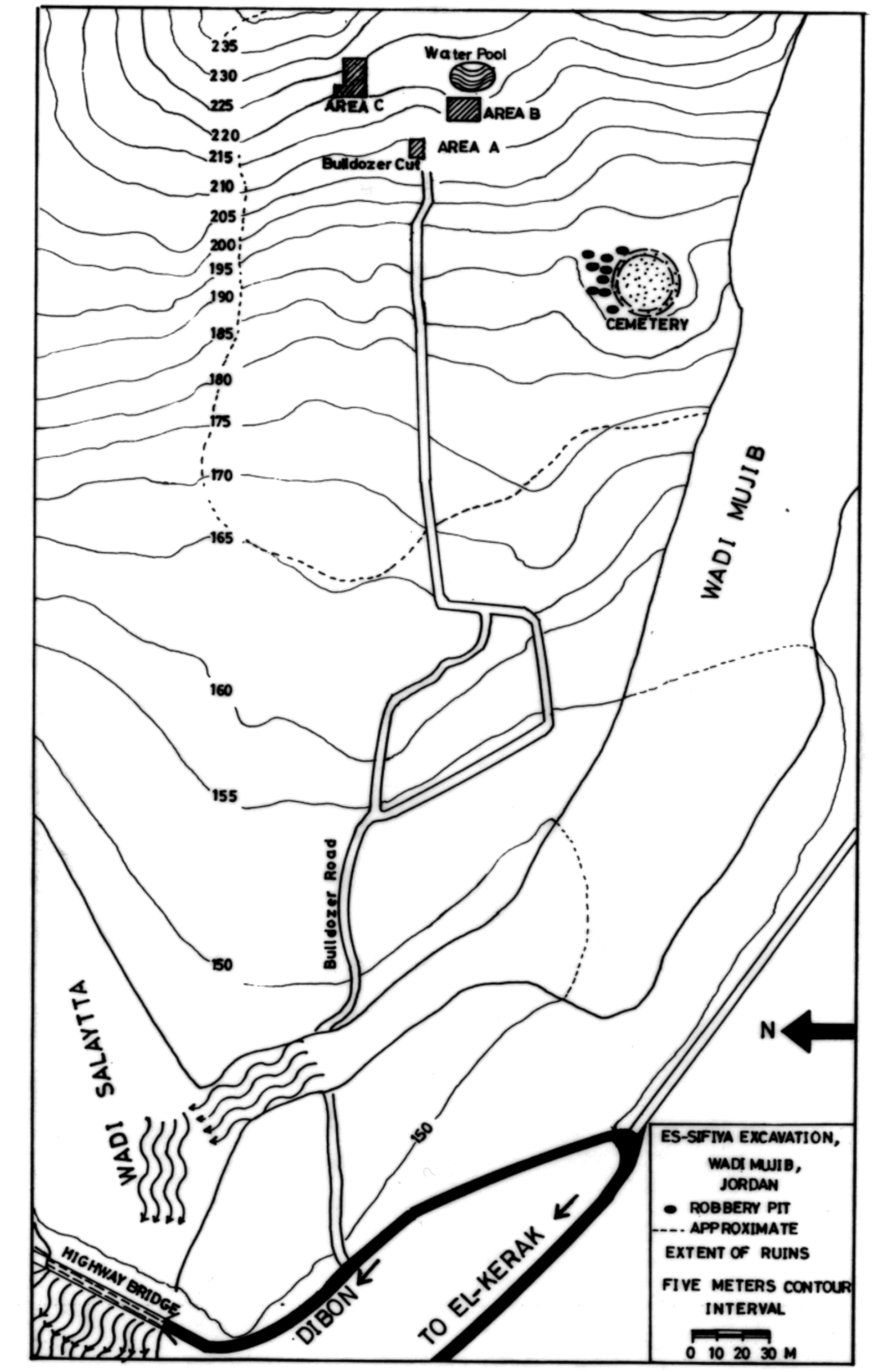

Fig. 2: es-Sifiya site map, showing the locations of the excavation areas.

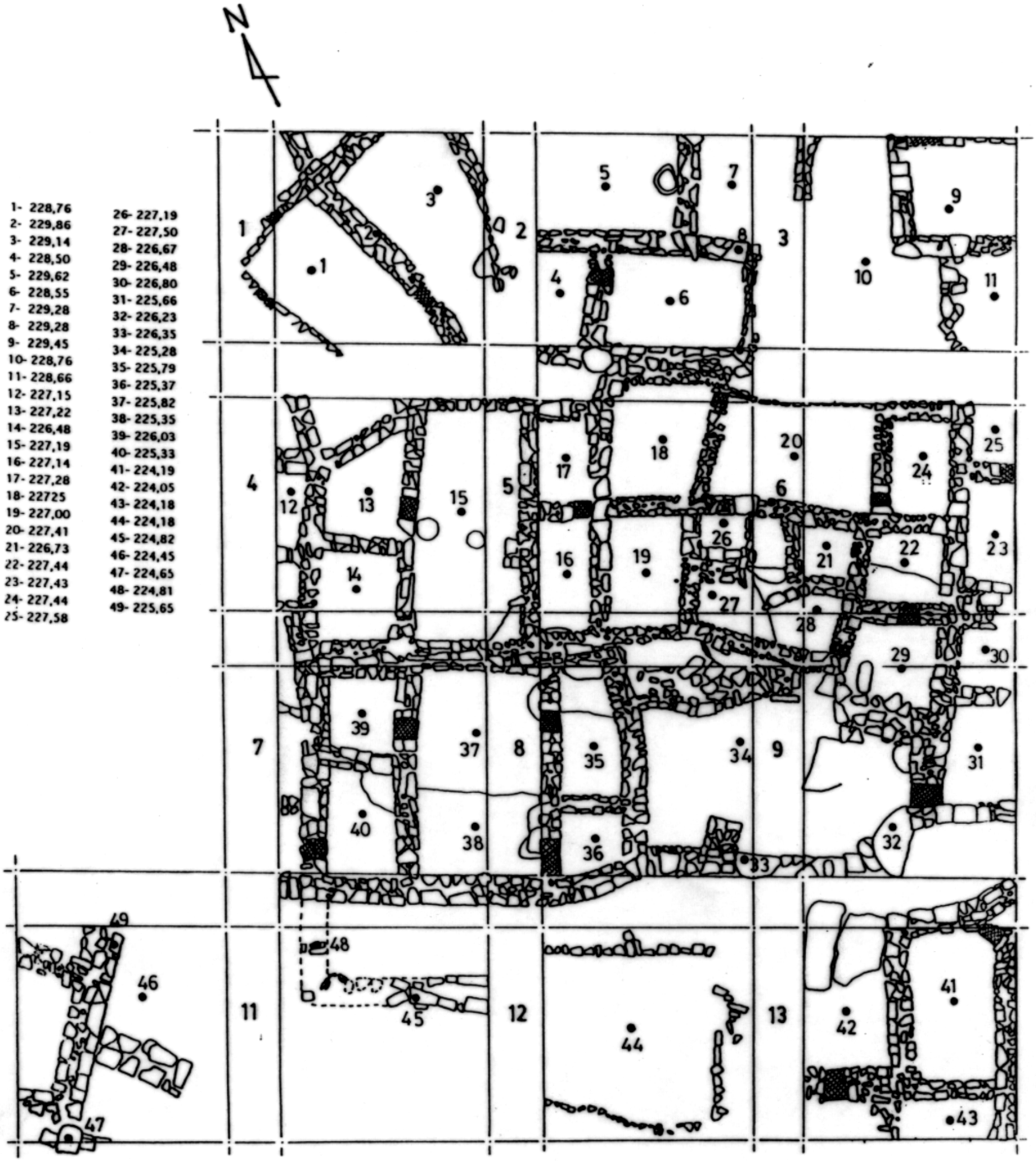

Fig . 3 : General plan of architectural remains excavated in Area C during the 1997 / 1998 field season.

terrace (Fig. 2). The results of the work in this area are presented here.

2. General Architectural Features and Ground Plans

The archaeological investigations in Area C started in September 1997 and lasted until August 1998 (on a weekend basis, two days each week). During the first week the surveyor started mapping the area and prepared the grid system. Thirteen squares (5x5m). were set up for excavation. Work concentrated on the exposure of the architectural remains, some of which with their typical Late PPNB masonry, were already visible on the surface.

Area C contains an extremely well preserved display of architecture (Fig. 4); some of the walls are still standing to the height of a little more than two meters. Walls were built double-faced to form rectangular, sometimes polygonal rooms. The latter features occurred in slope situations when room shapes had to adapt to topographic needs (Fig. 3). The ground plan of Area C resembles that of the Late PPNB architecture known from the previous excavations at es-Sifiya (Mahasneh 1996, fig. 3) and Area B (Mahasneh 1998, fig. 3). However, the ground plans of Area C appear more spacious.

The domestic ground plans consist of multi-roomed houses or building units, densely neighboring each other with no open spaces (Fig. 5). The general house plan is organized around a large, regularly shaped central room, which must have been the only room suitable for most household activities. Discussions with H.G.K. Gebel[1] supported the interpretation that the ground plan represents basement floors of two-storey buildings. On the floor of the central room (Square C4, Locus 10; Fig. 6) a very large mortar, three fragments of querns, a few pestles, hammer stones were exposed. The lower parts of two vessels, made of lime or lime-marl containing materials, were found in situ; a later analysis showed that they were fired at a low temperature. On the floor of the central room in square C6 two querns with grinding stones, a grinding slab, two rubbing stones, and a small stone bowl were found (Fig. 7). On the floor of the central room in square C8 (Locus 12) (Fig. 8) and square C9 (Locus 14) three querns, rubbing stones and fragments of stone bowls were uncovered. These artifacts and objects from the three central rooms indicate that food processing characterized the function of these large rooms.

Due to the large size of the central rooms, buttresses were built to support the walls and the roof-beams. Two preserved buttresses were recorded in Area C, one is attached to the eastern wall of the central room in square C4 (Locus 11), and the other one is attached to the southern wall of the central room in square C8 (Locus 14) (Fig. 8).

The central rooms of these building units or houses of Area C are surrounded on two or three sides by smaller rooms that could hardly serve any other function than storage (Fig. 9). The connections between the smaller rooms and the central rooms apparently were window-like wall openings, the size of which often would not allow an adult to pass through. These passages have nicely built jambs and lintels of regular dressed tabular limestone (Fig. 10).

Squares C2, C4, C1 and C13 (Fig. 3) of the excavation contained well-preserved architecture, presenting a pueblo-type terraced housing. The central rooms are more or less rectangular and thus probably planned on

Fig. 4: Overview of excavated remains in Area C seen from northwest.

Fig. 5: Excavation in Area C seen from north.

even terraces. Three terrace walls exist. The first runs east-west between squares C2, C5, C6; the second runs between squares C4, C5, C6 and C7, C8 and C9. The third extends between squares C7, C8, C11, and C12; there is a blocked doorway in this wall which indicates a later functional change in the ground plan (Fig. 11). Terrace walls protected the central rooms, most likely against slope pressure. Their masonry is not different from ordinary walls, although they are thicker.

Major walls, including the outer walls of the buildings, run down slope, thus providing better stability than the walls following contour lines. This shows that the settlers of Area C learned during their occupation of the steep slopes of es-Sifiya that walls running perpendicular to the contour lines remained stable longer, and that the rooms? walls set between them allowed for more flexible ground plans, an observation also made in Ba'ja, Areas D and F (Gebel, personal communication).

The double-faced walls of Area C were made of selected regular thick local limestone slabs that were roughly dressed and stabilized

Fig. 6: Part of the central room in square C4 with objects and artifacts in situ.

Fig. 7: The central room in square C6 with objects in situ.

Fig. 8: The central room in square C8 with buttress attached to the southern wall.

by inter-wedged small stones between the parallel courses (Fig. 12). The spaces between the two faces were filled with mortar and smaller stones of different sizes. The mortar appears to consist of dirt material mixed with settlement debris. All the walls of Area C have foundations constructed from large limestone and basalt boulders of different sizes and irregular shapes (Figs. 11, 13). Wall plaster is rarely attested in situ; larger pieces of red-stained wall plaster were found just above the floor on the walls (Loci 4, 5 and 7) of a large room in square C13.

Most of the floors of the building units were found intact. They were constructed from large to medium-sized gravel that was filled and leveled by finer stones, and a superimposed thick lime layer. The fine near-surface "slip" was smoothed and sometimes stained in red. Beneath, human burials were often in flexed positions (Mahasneh 2001), representing typical Neolithic burials (Bienert 1991, 19; 1955, 78; Mellaart 1975, 61; Singh 1974, 44).

The floors rested on dry-stone grill-type structures; their parallel walls were bridged over by rows of relatively large and flat slabs (Fig. 14). The excavation of Area C assured us that the existence of these sub-floor channels pertained to the entire area. In es-Sifiya,

Fig. 9: Small room in square C8 with a large basalt boulder used as part of the construction.

as is the case in many other Neolithic sites located on a slope, these sub-floor channel-like constructions allowed the settlers to create level building areas.

These sub-floor systems are one of the

Fig. 10: A small intact doorway connects the central room of square C8 with one of the small rooms.

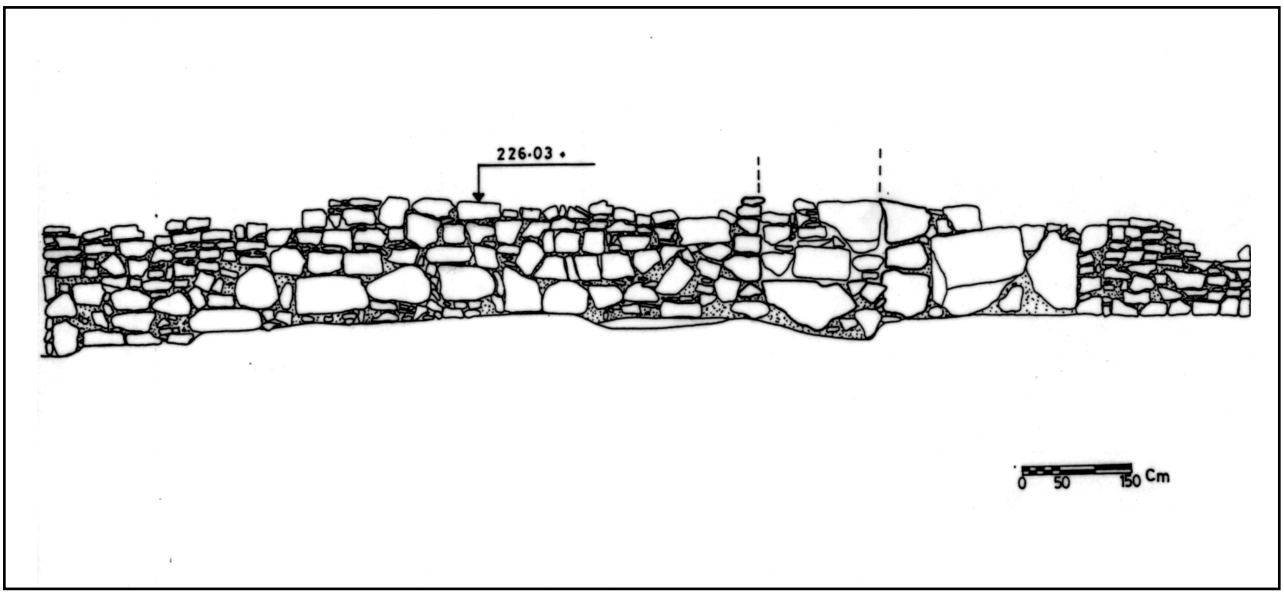

Fig. 11: Southern face of wall loci 8,13 and 16 in squares C7, C8 and C9. There is blocking of a doorway in this wall plan which indicates a functional change in the groundplan.

characteristics of Late PPNB architectural traditions in southern and central Jordan; such architectural elements never seem to have existed outside Jordan during this period. They are attested in Basta (Nissen et al. 1987, fig. 5; 1991, Plate. 1-3; Gebel et al. 1988, Plate. 1-2 and fig. 7), Ghwair 1 (Simmons and Najjar 1999a, 3), 'Ain Jammam (Gebel 1992a, fig. 7; Waheeb and Fino 1997, 218), al-Basit (Fino 1998b, 22), Khirbet el-Hammeh (Rollefson 1999, fig. 3) and 'Ain Ghazal (Rollefson 1997b, plate 1-C; Rollefson et al. 1999, 105 and fig. 7).

The stone building material was exploited from two sources; the majority was selected from the nearby limestone formations, while the large basalt boulders used as foundation stones and sometimes as building material existed in Area C. This was evidenced in square C8 (Locus 4) (Fig. 9).

The spatial organization of the es-Sifiye buildings is also attested at other contemporaneous sites in southern Jordan, e.g. Basta (Nissen et al. 1987, fig. 7; 1991, fig. 1; Gebel et al. 1988, 110), 'Ain Jammam (Gebel 1992a, fig. 7; Bisheh et al. 1993, 122; Waheeb 1996, 343; Waheeb and Fino 1997, 217), Ba'ja (Gebel 1999, 18-20; 2000a, 45; 2001a, 15; 2001b, 279-281; Gebel and Hermansen 1999, 19; 2000a, figs. 3-4; 2000b, fig. 2; Bienert and Gebel 1997a, 3-4; 1997b, 14; 1998, 77; Bastert et al. 2000, 42; Gebel and Bienert 1997a, 238; 1997b, 10; 1997c, 15), el-Basit (Fino 1997, 13; 1998a, 106; 1998b, 22), Ghwair 1 (Najjar 2001, 103; Simmons and Najjar 1998, 6; 1999a, 30; 1999b, 4; 2000, fig. 1), and el-

Fig. 12: Double-faced wall in square C10 with fine quality of stone masonry.

Hemmeh (Rollefson 1999,7) and Khirbet Hammam (Peterson 2000, 3) in Wadi el-Hasa.

With the completion of the 1997/1998 field seasons at Area C, six samples of wood charcoal were obtained from room floors (squares: C1 Locus 6; C3 Locus 5; C4 Locus 8; C5 Locus 9; C7 Locus 8 and C8 Locus 8). The samples were analyzed at the C14-Laboratory at the German Archaeological Institute, Berlin (Görsdorf 2000, 16). The calibrated radiocarbon dates of these samples range between 7040 cal BC and 6760 cal BC. This dating accords well with the typological correlations between the finds from es-Sifiya and the other Late PPNB sites in Jordan.

Fig. 13: Terrace wall with foundations contruted form limestone and basalt boulders.

Fig. 14: Part of the channels excavated in square C13.

3. Ground Stone Tools and Stone Vessels

The ground stone and stone vessels assembled from es-Sifiya during the 1997/1998 season of Area C are characteristic of the PPNB period of the southern Levant. Plenty of heavy-duty tools, mainly handstones, grinding stones, adzes, celts, pestles, pounders and grinding slabs, were recorded (Table I). Handstones represent the highest percentage among all the collected ground stones. They are made of quartzite.

Various kinds of grinding stones were present in a range of different sizes: spherical, ovoid, and rectangular in shape with rectangular, triangular, Plano-convex or globular cross-sections. These tools were used in trough-querns. They have striations that run across the shorter sides of the working surfaces, and the ends of the longer sides are turned up.

Heavy querns were rare at es-Sifiya, having presumably been replaced by trough-querns. Five fragments of trough querns and a complete one were recorded at the site. Figure 16 illustrates a well fabricated quern formed from a large, heavy block of basalt (65 x 35 cm). As might be expected, the depth increased with use, ranging from 2-15 cm. The base of the quern is rounded in both long and short sections, and the trough is open at one end and at the other slopes down from a flat area or apron that occupies around 20 percent of the total length. The quern has a distinct

Tool Classes	No.	Percentage
Hand stones	21	19.4
Grinding Stones	16	14.8
Grinding Slabs	14	13
Bowls (fragments)	20	18.6
Pestles	10	9.3
Celts	8	7.4
Adzes	7	6.5
Pounders	6	5.5
Querns	6	5.5
	108	**100%**

Table 1: Ground stone tool classes and percentages (Area C).

ridge running along both walls of the trough. Above this ridge the walls are smooth but unpolished, while below they are polished and very smooth.

Experiments suggest that the most convenient way to use such querns is to kneel with the apron gripped between the knees. The grain is pushed from the apron into the trough for grinding, and the flour is emptied from the open end by tilting the quern forward.

Heavy-duty ground stone tools such as mortars and large and small bowls were recorded. Many such tools were minimally modified and left unshaped on their exterior, whereas the interior surfaces were intentionally hollowed out.

The raw materials exploited for manufacturing ground stone tools and stone vessels are generally available locally. These include limestones of varied quality, carbonate rocks, quartz, and quartzitic sandstones. Other materials such as sandstones appear to have been brought from outside the area.

Fifteen fragments of white ware bowls were collected from Area C squares (Fig. 15). White ware is considered as one of the characteristics of the PPNB (Kafafi 1986, 54). It does not contain clay, and is a mixture of lime minerals with little quartz or chaff. The white ware manufacture is considered to be the experimental stage towards pottery production in the area throughout the following period.

4.Chipped Lithic Artifacts

The chipped stone artifacts obtained from Area C provides an excellent example of a typical Late PPNB domestic technology and tool kit (Gopher 1985). The recorded pieces of square C8 (Table 2) are selected here as a sample for the chipped stone industry of es-Sifiya. Most of these artifacts are made of flint (93%), but there are also pieces made of quartzite 4%, limestone 1%, igneous rock 1% and conglom-

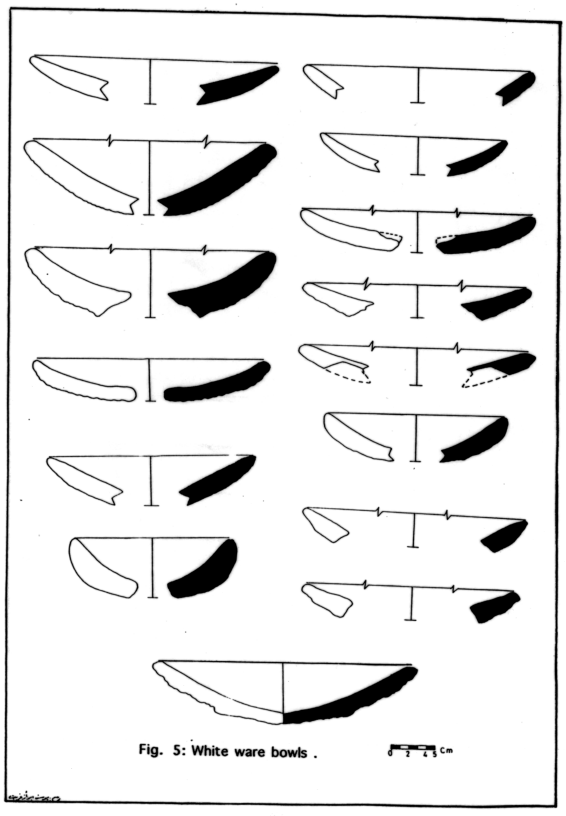

Fig. 15: White ware bowls.

Fig. 16: Large basalt quern uncovered through Bulldozer work in Area C.

erate 1%.

Despite the variety of flint raw material used at es-Sifiya, it appears that the source of most common raw material was the Hordos formation exposed near the site, containing many Eocene flint nodules and tabular layers that are easy to exploit. The major raw material classes were: 1- Dominating dark-brown to black flint of good quality. 2- Beige flint, some of which is homogeneous and good in quality, some of a lower quality containing "chalk" inclusions. 3- Purple, pink, orange-brown and beige flint, homogeneous and of high quality. This flint may have undergone heat treatment. 4- Heavily patinated and "worn" flint in low quantities.

This flint sample tends to be characterized by blades struck from naviform cores. This blade technology represents a highly standardized technology well-known from all the other PPNB mega-sites in southern Jordan (Gebel et al. 1988: 87). Projectiles in this sample constitute 27.1% of the tool assemblage from square C8, numbering 16 in all. Among the points 9 are complete and 6 are broken. 12 of these projectiles are of the Amuq type, 3 of the Byblos type and 1 of the Jericho type. Thus, the Amuq type dominates, a feature that might be true for all the es-Sifiya assemblages. These points are defined as leaf-shaped created on long blades blanks. The angle between the body and the tang is greater than 160 degrees. Amuq tangs may be shaped rectangular or trapezoid, but are usually pointed at the base of the tang (Gopher 1994: 39).

The preliminary observation of the tool kit shows that the chipped stone material reflects the ordinary Late PPNB daily kit used on household levels rather than including a major specialized export manufacturing at the site.

5. Other Stone Implements

Transverse grooved stones are a very interesting group of artifacts. In their typical form they are roughly ovate in shape and Pla-

	No.	%
Primary Elements		
Blades	80	48.2
Flakes	68	41.0
Bladelets	10	6.0
Cores	3	1.8
Hammer stones	5	3.0
secondary Production		
Arrowheads	16	27.1
Burins	9	15.3
Sickle Blades	8	13.6
Scrapers	7	11.9
Truncated Pieces	7	11.9
Celts	4	6.8
Borers	3	5.1
Chisels	3	5.1
Adzes	2	3.4
Total	**225**	

Table 2: Frequencies of tool classes from square C8.

no-convex in section. On the convex face a deep, concave groove runs across the long axis in the approximate center of the stone. The recovered grooved stones of Area C are made of basalt. Similar grooved stones were common and recorded at the Aceramic and Ceramic Neolithic sites of the Ancient Near East. R. L and R. S. Solecki (1970, 836-838) studied the function of the grooved stones, and they believed that grooved stones were heated and used for the straightening of shafts. This led Wechler to believe that these artifacts were connected with a special technique for weapons, and not directly with a Neolithic economy (Wechler 1997: 18).

The grooved stones were found scattered throughout all the squares of Area C. They have in common a loaf-shaped profile, a flattened base, and a symmetrical cross-profile around the groove. All have been carefully, even finely made with a surface as smooth as the material permitted. The qualities of straightness, flatness, and cross profile make it seem more likely that the tools were used to straighten and smooth arrow-shafts, and for sharpening bone points.

6. Worked Bone Industry

The worked bone industry of Area C almost exclusively represents tools and tool fragments belonging to the classes of awls and spatulas. But there is also an element of fine highly polished implements. There is little evidence for bone artifacts that do not represent tools. This tool class of Area C conforms well to other records (e.g. Gebel et al. 1988, fig.16; Nissen et al. 1987, 114; 1991, 23; Kirkbride 1966c, fig. 6).

In terms of definitions, the awls differ from points : awls have pointed working edges with a flat cross-section. Points have a rounded cross-section and are usually narrower than awls. They are highly polished, especially at the tip which is never found to be burned as it sometimes is shown by the awls. Campana (1989, 45; 1991, 465) reached the conclusion that both awls and points were used as perforating and drilling materials rather than projectiles.

The average length of these awls ranges from 6 to 8 cm. They are delicate and are made on splinters and on shafts. The tip and working edges of splinters are formed in order to give the tool a symmetrical shape. Shafts were longitudinally cut with parallel symmetrical sides. Most of the tips are rounded and have a polished appearance due to use. Some awls of both types have burned tips, perhaps for hardening the end of the imple-

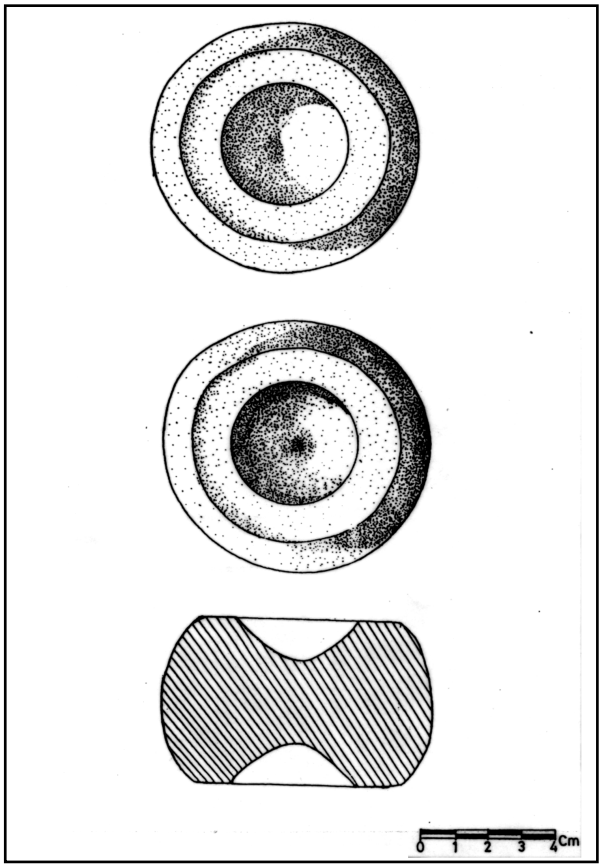

Fig. 17: Cylindrical basalt igneous rock artifact with two opposed depressions (sq. C8. locus. 7).

Fig. 18: Gameboard made of marble slab, with two rows of four heavily worn holes in surface (Sq. C8, locus. 11.).

ment in order to make it sturdier.

Awls or points made chiefly on long-bones of goat or ibex are the most numerous class, varying in length and width and in the relationship of the length of the worked portion to the rest of the shaft. Asymmetrical points formed on one edge of broad, rectangular sections of bones are comparatively rare. Shafts with rounded ends may have been used for softening leather. The awls as well as the points were polished along the entire length of the piece, and none of them had drilled holes at their proximal ends.

Spatulas of various sizes were found, all made of long bone splinters. One is an intact thin needle with an eye. The raw material of the worked bone industry came from both domesticated animals (goat and sheep) and wild animals, including gazelle and ibex. They were worked into tools by the techniques of cutting, sawing, percussion and scoring.

7. Other Finds

The excavation of Area C uncovered objects that differ from the mundane artifacts that normally don't obscure or define the individual residents they represent. The most important of these artifacts is a game board (Fig. 18). It is a rectangular marble slab with curved corners, measuring some 32x17x9 cm. It has two parallel rows of circular holes in surface, four in each row. The diameters and the depths of these holes are 3.5-cm. wide and 2 cm. deep. The base of this game board slab is flat. An incised line running between each row of holes is heavily worn in many places. Apparently this incised line served to line-up the holes during manufacture. Similar artifacts were recorded at the sites of Beidha (Kirkbride 1966c, 34, fig. 8:1) and 'Ain Ghazal (Rollefson 1996, 23, fig. 1; 1992, 1) and identified by the excavators as game boards.

The presence of the three complete game boards at Beidha, 'Ain Ghazal and es-Sifiya in the Aceramic Neolithic period should be taken to represent the earliest evidence of human game playing in Jordan. The Neolithic people of these mega-sites had leisure time to win or lose games during their cultural and social development. The design of these game boards has similarity to what is called today *"seeja"* or *"manqala"*, a modern wooden board game played throughout the villages of the Fertile Crescent, Persia and Turkey, by using small rounded pebbles or olive and date stones as counters.

The second artifact is a naturally shaped flat piece of soft limestone (Fig. 19) with a non-concentric depression from which grooves (width: 6mm. depth: 4mm.) with a pointed section lead off. The grooves do not really meet the center of the depression. The function remains unclear. It must have been seen as a common tool since several pieces were found in other Neolithic sites (e.g. Goring-Morris et al. 1998, 4).

The third artifact is made of a cylindrical basalt igneous rock with two opposed depressions. The piece is symmetrically pecked into the shape of a flat cylinder with slightly con-

vex outer contours (Fig. 17). The flat surfaces show mortar-like depressions (depths ca. 1.2 cm., top diameter 3.5 cm.). The height of the piece is 5.3 cm. and the maximum diameter is 7.8 cm. The function of the piece remains under discussion. It bears several interpretations including: as a weight, a double mini-mortar, an unfinished perforated cylinder (mace-head type), or a cylinder used to roll out or grind material. Since only the outer convex surfaces bear traces of red pigments, the latter interpretation might be the best explanation.

The fourth artifact is a naturally shaped cuboid fragment of gray limestone with a groove having a rounded base (width: 7 mm., depth: 5 mm.) (Fig. 20). Central parallel incisions lead off from the groove on one side at angles of 55-80 degrees. Usually such pieces are made in the PPNB from steatite; parallel incisions occur commonly on them. The interpretation normally is that they are shaft straighteners.

Figure 21 shows two fragments of naturally shaped soft limestone pieces with parallel incisions. One piece also shows incisions crossing these lines obliquely. The function of these fragments remains unclear. The same plate shows a natural cone-shaped facetted pebble (height: 28 mm., max. width: 19 mm.) with roughly horizontal incisions running almost all around the piece. Some incisions cross each other. The function of these pieces also remains unclear, although the latter piece resembles cone-shaped tokens made of clay.

Two rounded (pebble-like) pieces of plaster or oil-shale decorated with parallel incisions running all around the pieces in two directions (meeting approximately at right angles to form a net of incisions) were recorded (Fig. 22). One piece has four deep incisions crossed by two deep incisions, while the other piece bears many very neat incisions leaving spaces of less than one square mm. In the same plate, there is a flat cylindrical piece of plaster or oil-shale decorated with parallel and crossing incisions running not all around much of the piece in the same pattern and at the same distances. These pieces resemble the shape of a clay tokens, which also can have

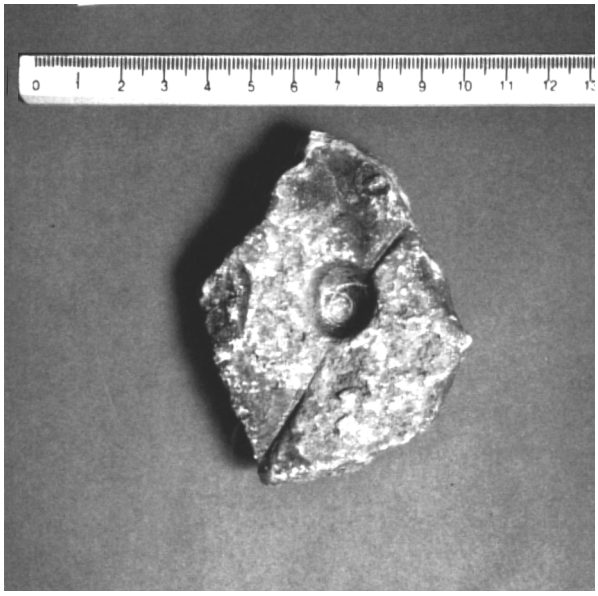

Fig. 19: Flat piece of limestone with a non-concentric depression (Sq. C8. locus. 7).

Fig. 20: Naturally shaped cuboid fragment of grey limestone (Sq. C8. locus. 7).

Fig. 21: Two fragments of naturally shaped soft limestone pieces bearing parallel incisions (Sq. C3. locus. 7), and a cone shaped facetted pebble having horizontal incision (Sq. C4. locus. 10).

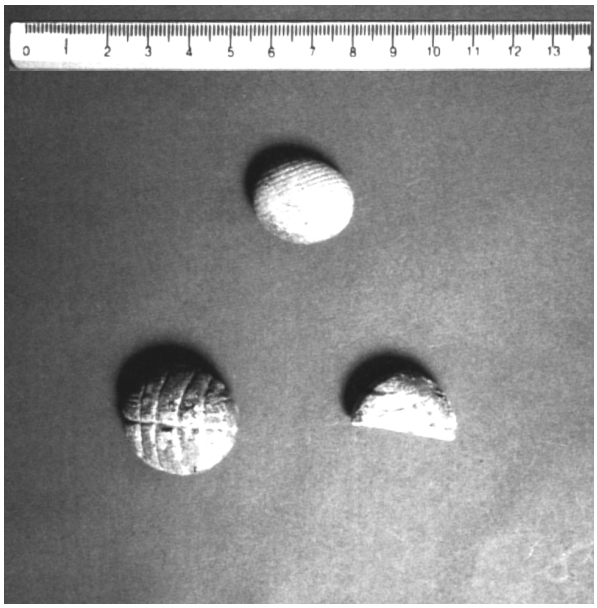

Fig. 22: Two rounded (pebble-like) pieces of plaster, and a flat cylindrical piece of plaster (Sq. C2. locus. 14).

such decoration.

The excavation of Area C uncovered a production area of geometric objects and human and animal figurines made of clay in square C11 (Locus 9) (Mahasneh and Gebel 1998; Mahasneh and Bienert 1999). They are similar to clay figurines found at other PPNB sites in Jordan (McAdam1997; Schmandt-Besserat 1998).

8. Subsistence and Food Production

We do not know what kind of vegetation covered the terraces and valley floors of Wadi Mujib in Neolithic times. It is worth mentioning that today the catchment on the slopes of Wadi Mujib bears small patches of oak, juniper, hawthorn, sycamore figs, retama and pistachio.

These species may indicate former conditions. On the valley floors nothing exists except a few pistachio and juniper trees and oleander bushes. We think that the valley beds or floors once included fringe forests. From such habitats the early farmers of es-Sifiya may have still gathered wild plants.

Concerning the botanical record from Area C of es-Sifiya, flotation samples have been analyzed[(2)]. The analysis shows that domestic emmer wheat, barley, lentils and chick peas were cultivated and harvested by the occupants of the site. All the examined specimens showed certain features of full cereal domestication. The environment and ecological setting of the site especially in the wet and fertile banks of the perennial water sources of Wadi Mujib were responsible for such advanced development in food production.

People living in Wadi Mujib today plant small stands of cereals in favored places. The large wadi beds and terraces are covered by small olive groves, grape vines, and small plots of tomatoes, beans and melons. The alluvial fans at the point where the wadis of the uplands debauch into Wadi Mujib are also exploited to the maximum.

Many animal remains were uncovered from

the deposits of Area C. The analysis of this collection shows that es-Sifiya represents an important source of information for documenting the increasing cultural control exercised by the early Neolithic over domesticable animals[3]. The majority of the animal bones of this collection belongs to goats while sheep are minimally present. Both species were domesticated and herded in Wadi Mujib. The analysis also shows that Bos, boar, gazelle, ibex, onager, hyrax, hare, badger, jackal and birds were hunted and utilized. These results indicate that hunting wild animals and birds still played a role in the diet of es-Sifiya occupants.

Bos and boar are forest creatures, and their presence in the faunal remains suggests that climatic conditions were wetter than today. While onager, gazelle and hare are steppe animals, bezoar, hyrax and ibex prefer rocky environments and would have been widely available right on the terraces near Wadi Mujib.

I was told by the locals of modern village es-Sifiya that there are no longer any ibex and hyrax in the area. This does not necessarily mean they have been shot and killed. It could easily be that their habitats have been destroyed by the advent of cars and bulldozer work in addition to electric generators used by the farmers in the wadi.

Both ibex and hyrax prefer the quiet places, and a few can still be found in the more remote areas to the west. However, jackals, hyenas, foxes, wolves and hares are the only wild animals that occasionally visit the area. Concerning birds, numerous could be seen, but the number and variety is not as great as it used to be. This decrease in bird life is due to increase in the local agricultural activities and the unorganized shooting of large birds. Wasse (1997, 586); Becker (1991, 64) and Kohler-Rollefson (1988, 88; 1992, 12; 1997, 558) believe that the amount of food obtained from hunting in the Late PPNB period declined sharply.

The domestication and exploitation of plants and animals had a profound effect on the es-Sifiya community. The people became sedentary and the assured supply of food gave rise to a rapid increase in the population, which led to the expansion in the settlement size during the Late PPNB era.

9. Discussion and Conclusion

The excavations of Area C at es-Sifiya have revealed a large settlement dating to the first half of the seventh millennium BC. The material culture and associated architectural remains indicate that this site had a long continuous occupation. Inhabitants had access to a range of local and distant resources, which resulted in a richness of archaeological material that is known also from contemporaneous Late PPNB settlements in southern Jordan. As research continues, it is clear that it will have to consider the regional integration of the site and its immediate neighborhood.

The most notable developments in PPNB of the Levant were the enormous growth of settlement sizes and the rapid growth of regional populations. In Jordan, in addition to es-Sifiya, the sites of the period became very large villages exceeding 6 hectares, e.g. ‘Ain Ghazal (Rollefson 2001, 97), Wadi Shu’eib (Simmons et al. 1989, 29), al-Basta (Nissen et al. 1987, 81; Gebel et al. 1988, 07), ‘Ain Jammam (Gebel 1992a, 3; Bisheh et al. 1993, 122; Abu Dayyeh et al. 1993, 86), Ghwair 1 (Najjar 2001, 103; Simmons and Najjar 1998, 5; 1999, 30; Powell and Gervasoni 1999, 1), al-Basit (Fino 1997, 13; 1998a, 103; 1998b, 22), Ba’ja (Gebel 2000, 45; Bienert et al. 2000, 121), el-Hammeh (Rollefson 1999, 6) and Beidha (Kirkbride 1966a; 1966b; 1996c;1968).

These large PPNB settlements are located in the mountainous areas running in a north-south direction east of the Jordan Rift Valley. The size of these settlements, their architecture and the rich material culture led the specialists on this period to propose different terms for these settlements like: proto-urban settlements (Frick 1997, 15), mega-sites (Gebel 1992b, 91; 1997, 1), towns (Simmons 1995, 119; 2001, 144), central settlements and site giganticism (Rollefson 1997b, 241; 1998, 111; 2001, 97). However, Bienert (2001, 107) believes that these settlements represent the first step of development towards early urbanism in the area.

The architectural remains uncovered at Area C of es-Sifiya are impressive, exhibiting a great investment of effort. Best known are the rectilinear houses with their plastered floors, intact windows, door lintels and the unusual system of channels beneath the floors. The crafts of building and making plaster floors testify to the investment of great effort. The inhabitants of es-Sifiya have left what appears to be their permanent settlement.

With reference to the ground plan of Area C and those of Area A and Area B, previously excavated at es-Sifiya, the architectural remains represent the cellular Late PPNB architecture now known from many Late PPNB sites in Jordan. The uncovered architecture in all of the thirteen excavated squares, which represented a pueblo-type terraced housing, is well preserved. The wall ruins occur just below a thin layer of colluvial deposits or are exposed on surface. The principal rooms in the excavated area are more or less rectangular and thus probably planned on even terraces.

The construction formula consists of a courtyard or large room with surrounding rows of small cells, common for the Late PPNB of southern Jordan. These elements of Late PPNB planning were altered according to the dictates of the topographical conditions, as on the slopes of es-Sifiya. Gebel (1997, 235) believes that regional climate should receive more attention in the interpretation of Late PPNB building units. This building system represents closed units centering inwards, which would have been shady and cool in summer and retained warmth in winter.

One of the most striking aspects of es-Sifiya is the intensity and concentration of the occupation, where the exotic resources are acquired. The need for timber for houses, palisades, and firewood must have made extensive demands on the surrounding environment, as did grazing and cultivation.

The impressive achievements of the Neolithic of southern Jordan, encompassing village life, crop domestication and animal husbandry, make the period one of the most attractive and compelling objectives of archaeological inquiry (Banning 1998, 219-221). From the material culture of Area C of es-Sifiya, it is obvious that we are dealing with well preserved dense terraced housing, comparable to that of present-day villages in areas of similar settings. Rich cultural layers provide typical Late PPNB industries with their evidence of specialized labor and crafts, substantially devoted to the production of what was needed for the settlers of es-Sifiya village.

It is striking that the chipped lithic industry of es-Sifiya seems to have had specialized naviform workshops. This element is known from other Late PPNB mega-sites in southern Jordan. Both the ground stone and the chipped lithic industries are well represented and do reflect the spectra of types known from other

Late PPNB sites.

The worked bone industry represents the entire range of items found in the contemporaneous Neolithic sites; they are standardized in terms of their manufacture. The selection of the splinters (awls) and the shafts was dependent on the type of bone used and the animal from which it originated. Generally, gazelle was the preferred, if not the only species used for most of the tools.

The advantage of single-period sites like es-Sifiya, which only could grow vertically due to limited space on steep slope terraces besieged by two wadis, is that it offers undistorted insights into the internal settlement organization and its spatial crowding, and thus giving clear evidence of the social organization of a Late PPNB community in southern Jordan. Future field work in the site might offer additional information about major activities practiced at such settlement because of its limited space for expansion.

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ملخّص: بعد النجاح الذي حققته مواسم التنقيب الأثرية السابقة في موقع الصفية، شجّع ذلك على موسم تنقيبب مكثّف في المنطقة (ج) من الموقع نفسه، خلال عامي ١٩٩٨/١٩٩٧ م. وكان هدف مشروع التنقيبب هذا، الكشف عن مزيد من الزخم الحضاري لموقع الصفية، والحصول على تواريخ كربون ١٤ المشع. ولتحقيق هذين الهدفين، حُفرت ثلاثة عشر مربعاً (٥ م X ٥ م)، أسفرت عن نتائج مهمة، إذ أرخّت الموقع بشكل قطعي إلى الفترة "ب" المتأخرة من العصر الحجري الحديث؛ إضافة إلى الكشف عن بقايا معمارية لوحدات سكنية ذات غرف متعددة، وأدوات حجرية لطحن الحبوب، وأدوات صوّانية، ومشغولات عظمية، وبقايا نباتات متفحّمة، وعظام حيوانات، ولقى فنية عديدة ومتنوعة.

Notes :

(1) I am deeply indebted to my colleague Hans Georg K. Gebel who has been most instrumental and supportive through the visits he made to our excavation. His encouragement and constructive comments on this subject are highly appreciated.

(2) The obtained carbonized seeds were analyzed by Professor Sayyed Khattari from the Faculty of Agriculture at Mu'tah University.

(3) I thank my Canadian colleague Kathy Gruspier for analyzing this faunal collection.

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