

Geologic Reconstruction of Numeira

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INTRODUCTION

During the 1977 and 1979 field seasons of the Expedition to the Dead Sea Plain, the geologic survey was mainly concerned with deciphering topographic changes that had occurred prior to, during, and after the Early Bronze occupational sequence at Bâb edh-Dhrâ^c (Donahue 1980, 1981). Bâb edh-Dhrâ^c is a relatively complicated site with a long occupational sequence, a rugged topography within the site, and a diversity of preoccupational, occupational, and postoccupational sediment types. By contrast, Numeira is a relatively simple site. The occupational sequence is short and apparently restricted to EB III (Rast and Schaub 1981: 35–44). With the exception of a 48 m drop to the present Wâdī Numeira stream, the topography is quite flat. Both natural and occupational sediments are relatively uniform, consisting of wâdī sand, gravel, and boulders. During the 1981 field season, excavations at Numeira exposed several critical data points. With the background of two intensive field seasons at Bâb edh-Dhrâ^c and the above data points, the geologic changes at Numeira have become quite clear.

REGIONAL SETTING

Numeira is situated on an alluvial fan surface located on the east side of the Dead Sea rift just east of the South Basin of the Dead Sea. This section of the rift is downdropped relative to the Arabah to the south and the Lisan Peninsula to the north where Bâb edh-Dhrâ^c is located. Movement along two east–west faults has caused a greater amount of downward displacement in this segment of the rift than in the segments to the south and north (Neev and Emery 1967: 20–24).

The alluvial fan on which Numeira is located is quite young. It was deposited after the termination of Lake Lisan some 16,000 years ago (Neev and Emery 1967: 26). The Lisan Marl, which is exposed at Bâb edh-Dhrâ^c, is located in the subsurface at Numeira. The main north–south fault forming the east side of the Dead Sea rift is located immediately east of Numeira, since the lower Palaeozoic Nubian sandstone crops out some 300 m east of Numeira and represents the up-thrown side of the border fault. The Wâdī Numeira itself is downcut through a considerable thickness of Nubian sandstone (fig. 1).

This regional setting helps define some of the conditions imposed on the Early Bronze occupants of Numeira, especially in terms of building materials. The major building material available consists of alluvial fan sediments, generally sand-through boulder-sized. Thus most of the tower, wall, and building construction at Numeira was of cobble- to boulder-size rock, largely composed of Nubian sandstone. The Wâdī Numeira does not cut through any basalt outcrops in the highlands to the east, so that basalt is a rare rock type in the area of Numeira. Basalt artifacts were probably derived either from the north or south of Numeira. In addition, mudbricks were not as common a construction material at Numeira, although a group of tumbled bricks was found in one area. This is a distinct contrast to Bâb edh-Dhrâ^c, where mudbrick construction was quite common. The absence of Lisan Marl outcrops at Numeira, an excellent material for mudbrick construction, probably explains this difference. The bricks that have been found are of very sandy composition.

Finally, no good or abundant outcrops of clay for pottery manufacture were found at Numeira. Several thin beds of clay are located in the alluvial

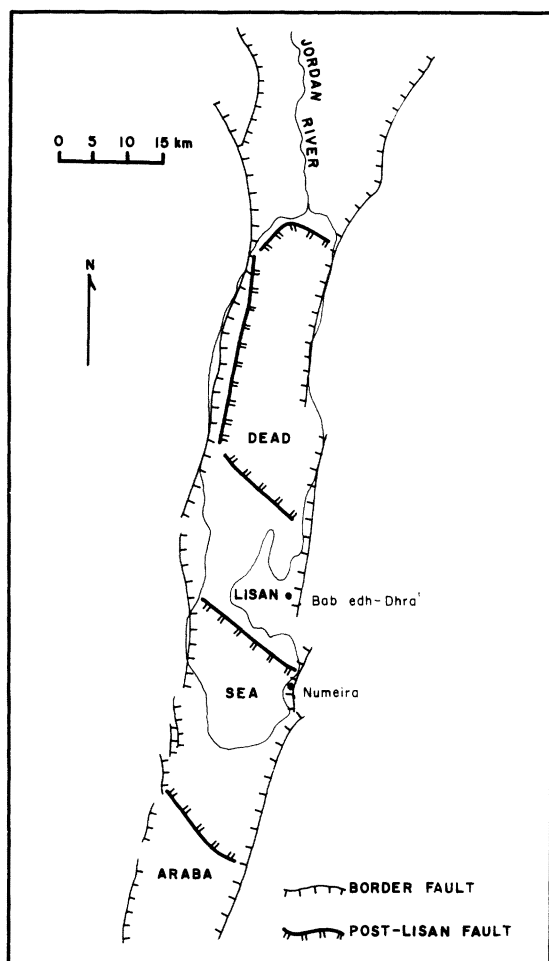


Fig. 1. Tectonic map of the Dead Sea rift, showing the location of Bâb edh-Dhrâ^c and Numeira. Major displacement has occurred on the eastern and western north-south border faults. A smaller amount of displacement has occurred on the east-west faults north and south of the Lisan peninsula and at the Arabah escarpment (after Neev and Emery 1967).

fan sediments. Otherwise it would appear that pottery or pottery clay was brought to the site (Beynon 1981; Beynon and Donahue 1982). Clay samples from Bâb edh-Dhrâ^c, as well as Numeira, are presently being examined by Robert Johnston at the Rochester Institute of Technology to compare them to pottery from both sites.

Preoccupational and Occupational Setting

The Early Bronze occupants who settled Numeira moved into a topographic setting markedly different from that seen today. This statement is based on several lines of field evidence.

The profile of Wâdī Numeira (fig. 2) demonstrates that a significant increase in downcutting occurred later in its evolution. Thus the lower 50 m of the wâdī is quite narrow (5 to 20 m in most areas) and straight-sided. About 0.5 km within the wâdī a series of waterfalls occurs, showing that the downcutting is still occurring. The narrow, straight-sided nature of the lower portion of the wâdī indicates that there was a sudden change in gradient, probably caused by fault movement. Either uplift of the highlands to the east or downdropping of the rift to the west caused a sharp increase in wadi stream gradient with resultant rapid downcutting. Whether this was the result of one large movement or a series of small movements is not known.

By contrast, the cross section of the upper portion of the Wâdī Numeira is gentle and bowl-shaped (fig. 3). This indicates a long period of erosion without drastic gradient changes. Thus the Wâdī Numeira has been effected by two different sequences of erosional history: an earlier, long-lasting erosion that developed the upper, "bowl-shaped" cross section; and the more recent, rapid downcutting that produced the narrow, straight-sided lower half of the wâdī. This is quite similar to, and even more striking than, the topography of the Wâdī Kerak seen at Bâb edh-Dhrâ^c (Donahue 1980).

The increased erosion rate that generated the lower part of the Wâdī Numeira was also responsible for removing the northern half of the alluvial fan on which the Numeira site is situated. The present 48 m drop from the site of Numeira down to the Wâdī Numeira stream was not present before the above-described erosion occurred. The alluvial fan probably had a smooth surface extending north to a small erosional remnant of the fan located north of the mouth of Wâdī Numeira. Thus the timing of the erosion becomes critical in reconstructing the physical setting prior to and during occupation of Numeira.

The archaeological excavations carried out at Numeira during the 1981 field season uncovered several data points that strongly suggest that the extensive erosion of the alluvial fan is postoccupational. The first of these is the excavation of wall and building lines on the north edge of the site. The wall and building lines extend up to and are truncated by the slope edge at the 48 m drop to the Wâdī Numeira stream (fig. 4). The tower on the east side of Numeira is also truncated where it abuts the slope down to the wâdī stream. Finally, a



Fig. 2. View from wadi stream, showing the mouth of the Wādī Numeira. The lower 50 m of the wadi has a narrow, steep-sided profile that is downcut through the Nubian sandstone. The site of Numeira is located on the alluvial fan surface in the upper right-hand corner of the photograph.

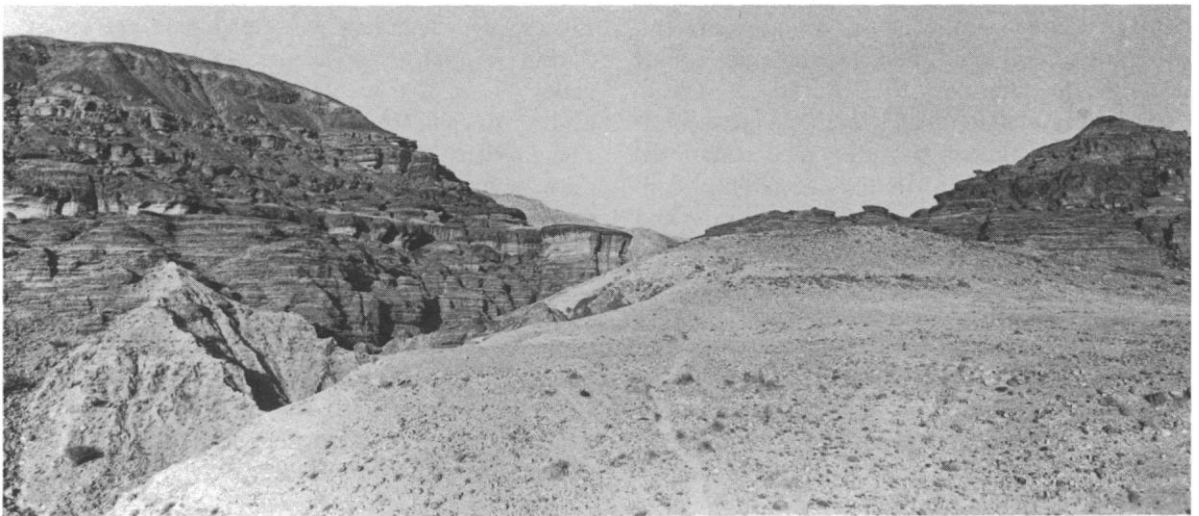


Fig. 3. Upper bowl-shaped portion of Wādī Numeira produced by long, continued, slow erosion through the Nubian sandstone.

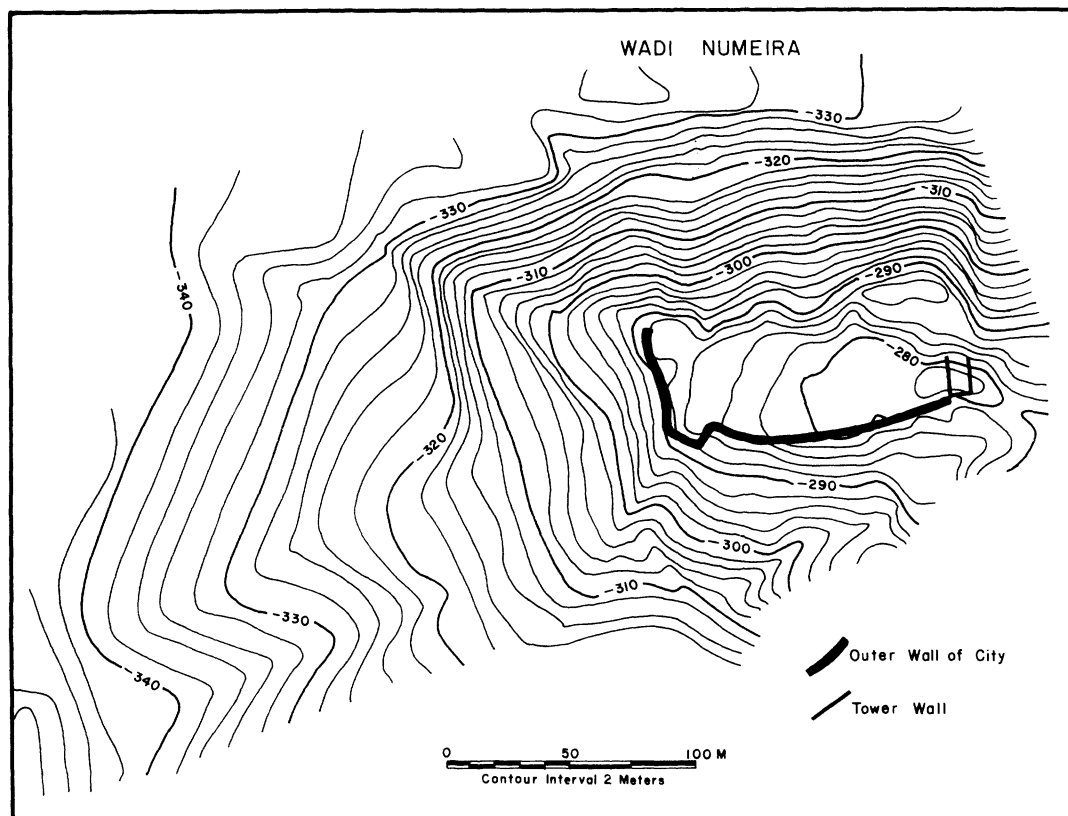


Fig. 4. Present topography at Numeira, showing truncation of the major wall line and tower.

small dry stream valley located just east of the tower is truncated on its up-gradient end by the above-mentioned slope.

The most significant section exposed at Numeira is an interbedded sequence of cultural sediment, sterile gravel and sand, and destructional rubble located on the east side of the tower (fig. 5). The 35 to 40 cm of sand and gravel contain no large cultural material and directly overlie an occupational floor. The occupational floor is apparently contemporaneous with the tower. The sterile sand and gravel are, in turn, overlain by destructional debris, apparently from the tower. Thin sections were prepared from the sand for microscopic examination. It consists of sand- to granule-sized (0.5 to 3 mm) grains of quartz, limestone, and chert. The grains are rounded, and the limestone fragments in particular exhibit a weathering rind. These characteristics are identical to sands examined from the streams in the Wādī Numeira and Kerak (Beynon 1981; Beynon and Donahue 1982). Thus this sand is fluvial in nature and was deposited during the time of occupation at Numeira.

The sand thins away from the tower downslope into the dry stream valley just east of the tower (fig. 6). Thin patches of sand are found in other portions of the dry valley. These data strongly suggest that a stream was flowing in the valley during occupation of the site. As mentioned, this valley's head is truncated by the erosional slope leading down to the present Wādī Numeira stream. The gradient of the valley, from the head down to the edge of the alluvial fan, is smooth and gradual, supporting the contention that a stream was flowing in the valley across the alluvial fan surface.

Putting all the field evidence together, a topographic reconstruction of the Numeira alluvial fan prior to and during the occupation is as follows. The Wādī Numeira was some 50 m shallower than at present, with a bowl-shaped cross section and relatively gentle gradient. The wādī stream flowed out across a flat, continuous alluvial fan surface deposited after termination of Lake Lisan. The Early Bronze occupants of Numeira built their site on the banks of this stream and had ready access to a water supply. The physical setting of the site

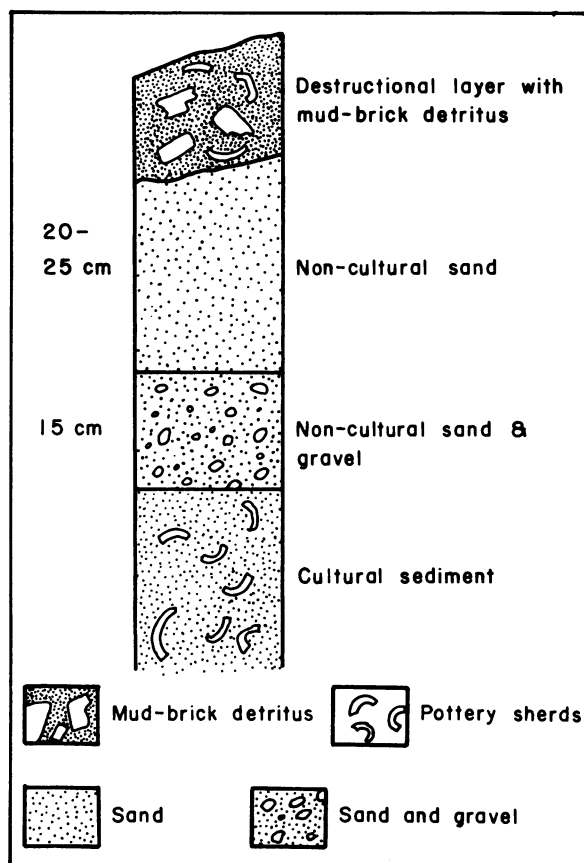


Fig. 5. Stratigraphic section, showing interbedded occupation floor, sterile stream gravel and sand, and destructional rubble.

during the Early Bronze age was reasonably attractive, with a convenient, nearby water supply and a high, flat alluvial fan surface with a good observational position.

Postoccupational Changes

Numeira had a short occupational sequence during just a portion of Early Bronze III and was terminated by one or possibly two closely-spaced, destructional sequences. Three individuals found adjacent to the tower during the 1981 excavations apparently were killed in the collapse of a portion of the tower. Although the matter can be debated, there seems to be no direct evidence for warfare during the destruction. Another explanation is that the tower collapse and extensive burn layers over the site were caused by an earthquake generated by fault movement (Coogan, this issue). The epicenter or fault movement may have been distant from Numeira, but vibrations caused by such movement could easily have caused partial collapse of the tower and buildings. Actual fissures would not necessarily be generated by such a movement. The extensive burn layer was probably caused by collapse and ignition of wooden roofing materials.

After occupation, the major change that occurred at Numeira was downcutting and erosion of the northern half of the alluvial fan on which the site is located. This was in direct response to an



Fig. 6. Dry stream valley draining across alluvial fan surface east and south of Numeira.

increased gradient in the Wādī Numeira, probably caused by fault movements along the eastern border fault of the Dead Sea rift. The wādī stream that originally flowed past the site of Numeira shifted its course slightly northward and eroded the northern half of the alluvial fan. The exact timing of this erosion and the amount of the northern portion of Numeira that has been destroyed by erosion are not known.

SUMMARY

The site of Numeira was constructed by Early

Bronze people on a flat, high-standing alluvial fan surface. Construction was adjacent to a small wādī stream that had incised a gently sloping valley across the surface of the alluvial fan. It is suggested here that the destructional sequence at Numeira may have been caused by an earthquake in the Dead Sea area, with the understanding that evidence for this is very tenuous. Fault movement and resultant increases in the stream gradient for the Wādī Numeira caused extensive erosion of the northern half of the alluvial fan on which Numeira is situated. The northern portion of Numeira was also removed by this erosion.¹

NOTE

¹I thank the codirectors of the Expedition to the Dead Sea Plain for their continual cooperation and tireless energy in making the expedition and my work a reality. Discussions with Michael Coogan and Theodore Ludwig

at the Numeira site helped greatly in reaching the conclusions presented here. As in previous expeditions, living with the Jordanian people proved a rich and rewarding experience.

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