

# Neolithic Ba'ja Hidden Settlement



Is it possible that still further neolithic settlements are to be discovered in the Jordanian mountains around the famed Nabataean capital Petra? Several prehistoric settlements from this period have already been located some time ago. Newly discovered Ba'ja is such a case and we hope not the last amazing early settlement still to be found.

#### ***Early Dense Settlement Area?***

How dense was this area populated in neolithic times? Remember the climatic conditions at the time were far wetter and the landscape much greener and fertile. How large a population could this mountainous area support at that time? Archaeologists still try to answer these and other important questions. But Ba'ja seems to be very different than other early settlements in this region.

#### ***Special Mountain Location***

This village from the so-called PPNB or Pre-Pottery Neolithic B period lies totally hidden in a narrow valley between vertical cliffs. With an extension of 1.5 hectare, it is rather large for the time. And its location is also untypical for this period. The selection of its position in an isolated mountain area in an altitude of 1.200 meters east of Wadi Araba and ten kilometers north of Petra is unique. But on camel back this was only a half day journey from Petra.

#### ***Old Tribal Ground***

This extraordinary settlement could only be reached via an extremely narrow canyon measuring a mere two meters in width and seventy

meters in length. The local Bedouins call the neolithic site today al-Mehmad which lies in the old tribal area of the al-Amarin tribe.

#### ***Perfect Hide Out***

It is the perfect defensive location and reminds us of Petra's entrance canyon called Siq. After this canyon which could only be passed by one man at a time the valley opens up. But the descending valley allowed only buildings on terraced ground supported by retaining walls. The valley area is rather small with an extension of 15.000 square meters.

#### ***Narrow Valley***

The valley runs in a southwest to northeast direction. It is only 300 meters long and between 20 to 90 meters wide. We already mentioned the steepness of the ground with an altitude difference of 35 meters. The gradient in some areas reaches a maximum of 40 degrees. A location situation not very apt for establishing a village.

#### ***Double Story Buildings***

Due to the limited space its inhabitants erected already 9.000 years ago double story stone buildings with a height of four meters. The inclined ground forced builders to erect houses with stepped rooms in a half floor elevation system.

#### ***Ba'ja Discovery***

1961 the site was first mentioned. Only 30 years later a first surface inspection of the site took place. Remains of walls were not visible.

Therefore, archaeologists assumed that only 20 houses could have existed here. But today we know this assumption is far too low. Many ancient pottery sherds were scattered over the grounds. The visible remains of cisterns and canals were assumed to be from Nabataean times. This was also not correct as later excavations proved.

#### ***Long Occupation?***

Only two years later archeologists revisited the site and validated the pottery sherds. They classified them into four periods: Neolithic, Nabataean, Late Roman to Byzantine and finally Late Islamic to Ottoman. That proves that the site was inhabited for thousands of years. But we do not know if it was used uninterruptedly. This so far was only proved for the neolithic period.

#### ***Starting Excavations***

First excavations started finally 1997 with experts from different countries. Until 2018 twelve excavation campaigns took place. Archaeologists assume that over 600 clan members from 60 families lived and worked here. These numbers are relatively high for an early neolithic settlement.

#### ***Hidden Location***

But why did early neolithic settlers choose this isolated place? Did attacks happen already at that time? Did they have to protect their wealth and valued goods as Nabataeans had to later in Petra? Why did they take this isolated and difficult to reach location into

account? All food stuffs had to be transported laboriously to their site. Animal shepherding was also not possibly inside the narrow valley which was another challenge.

#### ***Simple Structures***

For the first time steps had been erected to reach a neolithic settlement site. The houses were built similar to those at Basta, al-Baset or Ain Jammam, Ghwair, as-Sifiyar and partly as famous Ain Ghazal. At Basta only single floor houses were constructed. Experts classify Ba'ja as pueblo typical structure with block houses without doors and windows which were entered via the roof.

#### ***House Layouts***

Nearly all houses had two floors some even three. Typical Ba'ja houses measured 80 square meters with small rooms around a central courtyard. On the ground floor goods were stored. Here the family also buried their deceased. Workshops were situated on the first floor together with a combined living, cooking and sleeping room which could be as large as 15 square meters. This room could be open or covered. Ba'ja cooking was done in clay ovens.

#### ***Roof Entry***

Was it the lack of space which forced builders to omit passages between houses? Entry to houses was only possible via the roof using stone steps or wooden ladders. Similar entries we have used at famed Catal Hoeyuek a thousand kilometers further north in southern





Anatolia. Doors and windows were not existent. Ventilation happened via roof openings.

#### ***House Usage***

Houses were both workshops, storage and living quarters. All families produced the thought after sandstone rings which we will explain later on in detail. This happened in a first division of labour for the different steps of production. It was a new development for the neolithic period. In one house four rooms each with cooking place and ovens were found. Was this a first communal kitchen building? Or was it a workshop to harden materials like tools made from bones or baking pottery items?

#### ***First Burnt Pottery***

Archaeologists assume that Ba'ja produced first clay pots burnt at low temperatures. This could not be called a ceramic production because of low temperatures and missing hardness of pots. Broken pieces of a large half burnt pot were found here. These sherds were not hard enough to be transported. Therefore, they were only good for own use. Or did the Ba'ja inhabitants experiment to produce the first hardware pottery pots? This might be possible as lumps with mineral containing coating were found here as well. But this could be pure coincidence.

#### ***Simple Wall Structures***

Perfectly set building stones were piled up

without mortar. Ba'ja builders used the double wall structure filled in between with small pebbles. But the walls were not for stability purposes erected interlocked at the corners. In the fillings archaeologists discovered also bones and larger stone tools which were placed there on purpose. This ritual was believed to give its inhabitants strength and keep away evils.

#### ***Lack of Stability***

This lack of stability was made up by supporting pillars on the inside which unfortunately did reduce the available space. Straight walls were erected with the help of plumb bob and line. The erection of foundations was not done. The stony underground allowed construction of houses without foundations. Or were the neolithic builders more experienced than we imagine? Because of the regular earthquakes in this area missing foundations might have been a benefit.

#### ***Simple Ceilings***

Ceilings were done with many parallel wooden beams placed on crossbars. They were covered with woven reed mats, large leaves and a layer of clay or lime. The thickness of ceilings was about 30 centimeters.





### ***Wall Plaster and Paintings***

Later burnt lime and plaster was used. The plaster was mixed with reddish silicate colours and painted in a fresco like manner. Unfortunately, only in one place simple painted motives were discovered. For the floors builders used four different techniques. First the floors were stamped, then done in lime plaster, later plaster was poured over a pebble layer and finally a fine screed was applied. This came very close to the later used terrazzo technique. These screeds were applied also to the walls.

### ***Naïve Building***

Due to the lack of interlocked walls some experts speak of a naïve building manner. Because 500 years earlier developed building techniques were already known in the region. These techniques were not used in Ba'ja for example to better master the steep inclined terrain, annual winter floods and earthquakes. Or did they develop just a more suitable solution for these challenges?



### ***Different Usage***

The further we go back in history the more varied the use of houses could be. This was dependent of the cultural and social conditions. The inhabitants of Ba'ja had a very different attitude to their homes as we have today. In an egalitarian system ownership had a different meaning and value. In Ba'ja houses were permanently rebuilt and overbuilt. Individual property limits did not exist.

### ***Burning Down on Purpose?***

The purposely burning down of houses to create new homes we already know from Catal Hoeyoek. In Ba'ja deceased family members were also buried within houses. Were houses therefore burnt down ritually to create a karma free place for its new inhabitants? In the neolithic world of beliefs this could be a possible explanation. In Ba'ja traces of burnt houses were found which do not indicate any accidental burning. Archaeologists call this the purposefully dissolving of a household with all its belongings. This was more com-





mon in Ba'ja. Houses were simply demolished to start anew. The ground floors were filled up with the rubble and a new floor added on top.

### ***Specialized Construction***

Experts established that different builders were responsible for erecting new houses and other for repair and restructuring. Because after the annual floodings regular repairs were necessary on a wide scale. The workers for this task were less talented archaeologists found out. This early specialization for construction works during neolithic times is surprising.

### ***Regular Changes***

Collapsed walls were a common problem due to the steep inclination and regular floodings. This led to regular changes in house layouts. Rooms were partitioned and internal walls moved. This was possible as walls were not interlocked in the corners. Possibly this was often necessary because of regular changes in the size of families or ownership.

### ***Earthquakes Too***

Archaeologists could prove that at least one earthquake destroyed many houses. As a result, the lower floors were filled up and a new floor built on top. The earthquake changed the practice of inhouse family burials. These were not the norm in the neolithic period in this region. Possibly the earthquake did force a quick decision and so all inhabitants who died during the earthquake were buried in collective graves outside.

### ***Collective Graves***

In nearly all houses in Ba'ja excavators unearthed family graves. Collective graves are unique in this region and were only found in

Ba'ja. The lack of space in the valley could be a reason because no cemetery was found. The small graves were used multiple times. In one pit four adults and four children were found. A baby was also part of this group. In another grave three men plus one woman and two children were buried. Child mortality seems to have been high at the time.

### ***Few Single Graves***

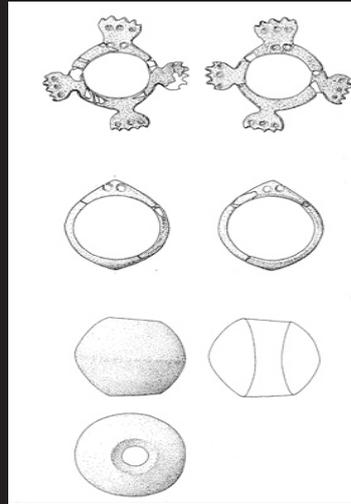
But single graves were also found. A man was buried carefully with various grave goods. Later on, excavators discovered a single girl burial with an extraordinary necklace. Were single burials a new funeral form in Ba'ja? Did excavators not dig deep enough to find further single burials? Or did Ba'ja develop later a special burial ritual? Because in neolithic times house burials were the norm.

### ***Different Burial Types***

Only towards the end of excavations experts became a better insight into burials and the used rituals. Next to collective and single burials they also found wooden coffins and informal pits filled with human and some animal bones. Burials with domesticated animals







### **Functioning Social Structure**

Experts were surprised that no communal and administrative buildings were found. Reason being that the inhabitants of Ba'ja were living in an egalitarian clan community of families. Possibly it was a society in transformation which developed from semi sedentary hunter gatherer clans to fully settled herders, farmers and artisans.

### **Public Life**

The roof spaces of houses were public areas and served as passages in this tied knight village squeezed in between high cliffs. It is assumed that the roof areas served as meeting places. A central place was discovered but this was over built with houses later because Ba'ja grew further over time.

### **Varied Menu**

Experts established that the menu consisted of various corns like emmer, many fruits like wild figs, numerous nuts and roots. We know from other early neolithic settlements that their menu included around 100 food stuff items. As construction and burning material served pistachio and juniper trees growing in the area.

### **Herding and Husbandry**

Husbandry of domesticated sheep and goats was wide spread which produced milk and meat. Most people at the time were lactose intolerant and therefore cow milk was not of interest. The domesticated animals covered 80 percent of their nutritional needs. The rest was added through hunting wild animals.

### **Still Hunting**

Nevertheless, animals were hunted. To the list of prey belonged wild goat, ibex, wild boar, gazelle, hare, hedgehog but also larger animals such as aurochs, wild horse, onager a wild donkey and carnivores such as leopard and fox. Possibly the latter were only hunted for their fur and leather.

### **Famed Sandstone Rings**

The reason of the intensive production of sandstone rings in the whole village is still not known. It is clear that these rings had an important cultural role and were traded in the whole region. They presented a valuable income and unique selling point for Ba'ja. Archaeologists established that each household produced these 5 to 16 centimeters large sandstone rings. And this was done in



a step-by-step division of labor production process. Sandstone in this area can be very soft and cut easily with a fingernail. But the hard form is also present here.

### **Silex Tools**

It is assumed that the Ba'ja artisans did not produce their own silex working tools. Because silex splinters typical for silex workshops were not found. But where did the many silex tools such as arrow heads, drills, hand axes and hammer stones come from? Only simple stone tools were produced on site.

### **Special Artefacts**

A unique sandstone ring proves how advanced the Ba'ja artisan production was. It was assembled out of several thin rings and covered by a white lime layer. Experts assume it was a special jewelry item worn on the upper arm.

### **Found Tools**

Next to the many silex tools archaeologists unearthed various bone tools as well. The Ba'ja artisans were experts in manufacturing bone tools. Their points were hardened skillfully over fire. In this way sewing needles, ells, spatulas and scrapers were made of goat and sheep bones. Excavators also found stone bowls with pressing stones to shred corn or squeeze juice.

### **More Workshops**

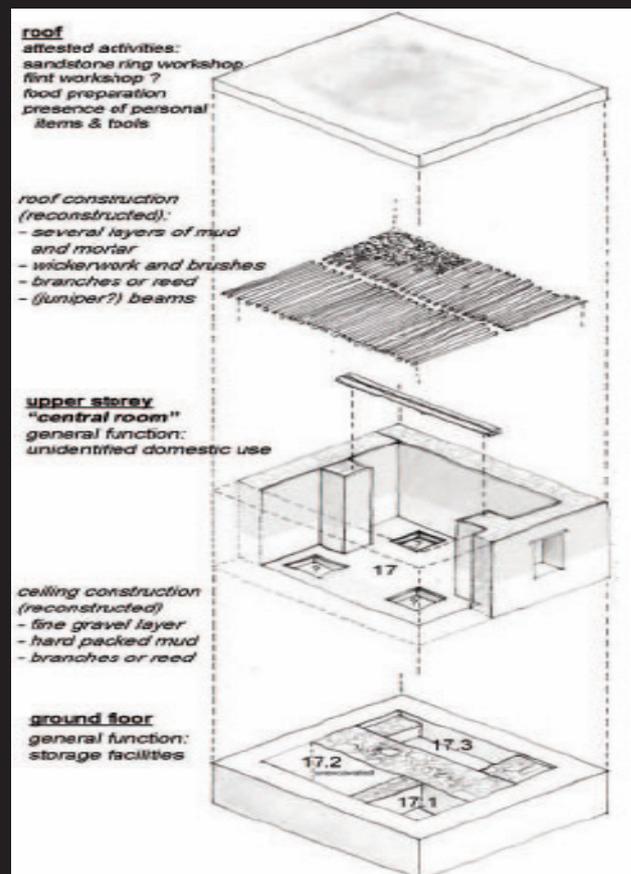
Next to the production of the thought after sandstone rings archaeologists discovered further workshops to produce various other items which were traded and added to the wealth of Ba'ja residents. The trading goods included woven textiles, leather items and clothing with ornaments. Some of these were totally new items for this early neolithic period.

### **Jewelry Items**

Many found shells came from the Red Sea and prove an existing and active long-distance trade. Artisans used shells from many different species. They presented 80 percent of all jewelry items made. Such items and their fine processing were unique for the early PPNB period.

### **Extraordinary Pearl Necklace**

A very skillfully made necklace with eight



pearl strings is really amazing for this early period. It was discovered in a single grave of a girl established to be eight years old. The 2.500 pearls plus cylinders and small rings originated from various places afar. They included shells, corals, small animal bones, hematite, malachite, turquoise, carnelian and other semi-precious stones as you can see in the picture. It is amazing to see this most beautiful jewelry piece being produced so early on already.

### **Important Questions**

For what purposes were the unique sandstone rings really used? Were they jewelry items or did they have an important ritual purpose? Certainly, they were an important source of income based on a far-reaching trading activity. Or were they possibly a money substitute as coins did not yet exist? These questions have not really been answered yet. So far it is unknown why the early Ba'ja settlers chose this extremely secluded location. Were attacks from other clans already common practice at the time? But why did other settlements in the area been established at the same time in the open landscape?

### **Unique Rituals**

At Ba'ja unique rituals were practiced. For

example, items such as silex axes, milling stones and animal bones were deposited inside house walls. Human and animal bones were found in floor screed as well as small stone bowls turned upside down. Similar rituals seemed to have been practiced in the nearby Basta village. Experts assume that wall deposits should keep evils away and screed additions were linked to funeral rituals.

### *Giving Up Ba'ja*

Why was Ba'ja left by its inhabitants? Did the demand for sandstone rings reduce? Was the reason really economical? Or did the difficult supply with food stuffs play a role? Archaeologists have found some prove of the latter. They established that Ba'ja was left surprisingly and rapidly with many items left behind. It might have been various reasons. Possibly it was an earthquake again, extreme flooding, pandemic or attack which made them flee.

### *Further Developments*

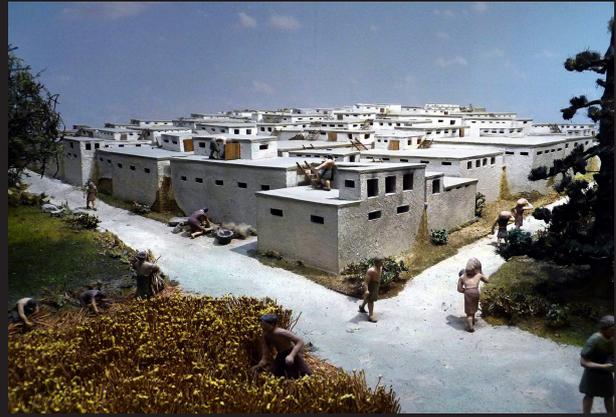
What happened after the neolithic settlement period? Ruined Ba'ja went into further decay and was more and more covered up with debris by the annual winter floods until all visible traces disappeared. Only during Nabataean times archaeologists could identify some renewed terracing. Not for living but for agricultural purposes as the valley offered good conditions.

### *Conclusions*

A visit to the site is not worthwhile because of the difficult entry and filled up excavation areas. There is really nothing to see other than the feeling standing on historically important ground. We recommend to visit instead the two other neolithic settlements in the area from the same period. Please see the respective article on this website. Near the so-called Little Petra it is el-Beidha with round huts and later square houses and Shkarat Msaid from ther same period next to the new road on the way up to the pass going down into Wadi Araba. But Ba'ja is unique for its early double story houses, construction without foundations, walls not interlocked in corners and its early production of intriguing sandstone rings in first division of labour process.

### *Photo Credits*

We thank University Berlin and other universities, their institutes and excavators on site for making available their pictures and graphs



*Above: Catal Hoeyuek in Anatolia also had a pueblo type layout without passages in between and houses being entered via the roof*



*Above: Square houses at el-Beidha were single floor structures and the walls were erected with irregular formed stones*



*Above: Shkarat Msaid site house on a plateau in similar structure as el-Beidha. In both settlements earlier built simple round huts were erected. They were half dug into the ground and fully open after a wall heights of one meter. The leave covered roof rested on wooden poles.*