

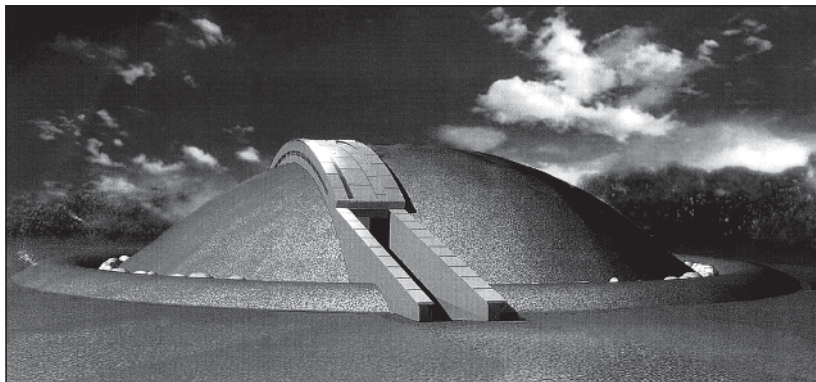


Fig. 2 Tumulus No 115 after reconstruction. ■ Mohyla č. 115 po rekonstrukci. ■ Grabhügel No.115 nach der Rekonstruktion. ■

Archaeological Park Százhalombatta, Hungary

Ildikó Poroszlai Matrica Museum and Archaeological Park, Százhalombatta

The first open air prehistoric museum in Hungary was opened in 1996 under the aegis of the local Matrica Museum. The park is situated in the southernmost part of a large Iron Age tumulus cemetery where the best preserved tumuli can be found (**Fig. 1**). The settlement - Százhalombatta - derives its name from these tumuli which date back to the Hallstatt period: **Száz = hundred, halom = hills/tumuli**.

Developments at the park advanced step by step within this 6 hectare area: beside a unique in situ reconstruction of an Iron Age burial mound, living areas from the Bronze- and Iron Age are introduced as well. Among various archaeological experiments, a wheat cultivation experiment and environmental reconstruction are also taking place.

Prehistoric handicraft activities are available for children and adults. Environmental and experimental archaeological courses for students are organized each year in September. The results are published in a series and other publications (*Poroszlai-Vicze ed.1999*).

There have been several excavations within the Hallstatt cemetery and the nearby Iron and Bronze Age fortified settlements (*Holport 1985, 1996, Marton 1996, Poroszlai 1992, 1996, 2000*). These revealed tumuli dating back to the second half of the 7th century (Hallstatt C). Urns or scattered cremation burials can be found within stone packing or in wooden grave chambers with stone packing which have been found under the tumuli. Usually only one burial with associated grave goods was placed beneath a tumulus.

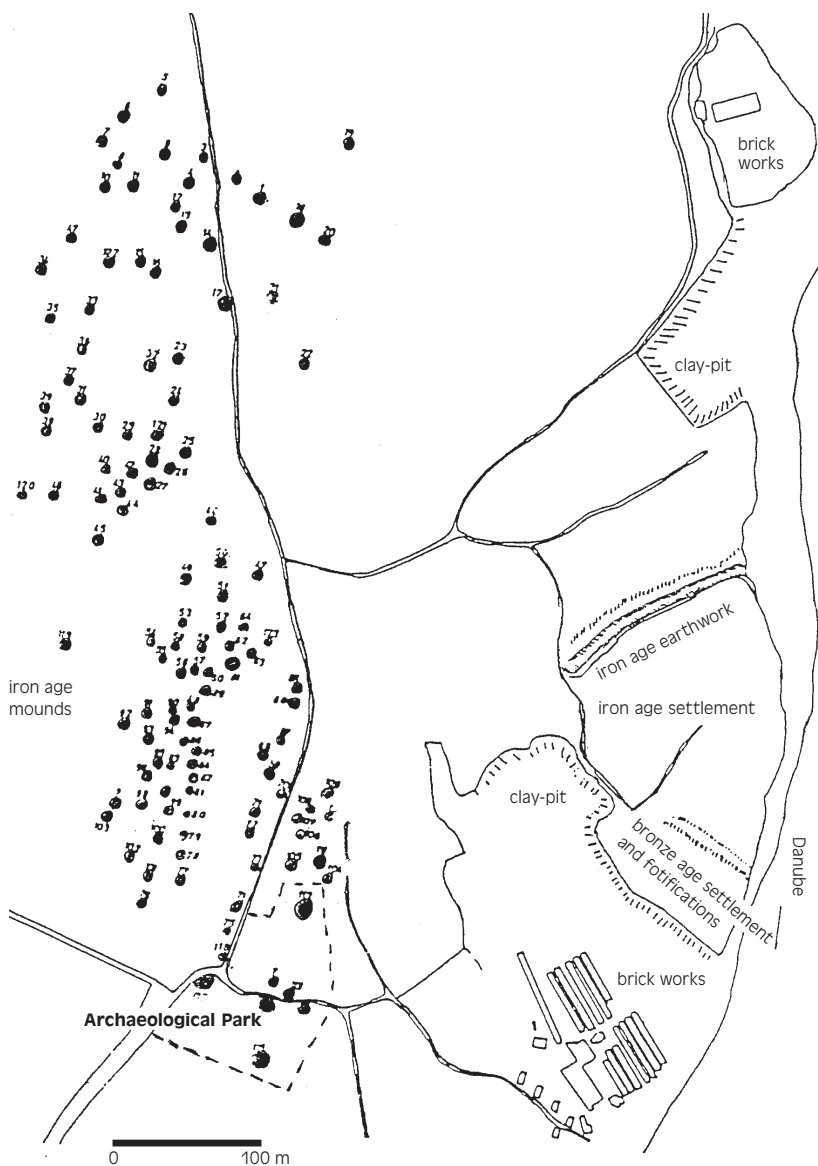


Fig. 1 Százhalombatta Archaeological Park within the Bronze- and Iron Age site complex. ■ Archeopark Százhalombatta na místě nálezistě z doby bronzové a železné. ■ Der archäologische Park Százhalombatta – ein Gelände für die Bronzezeit und Eisenzeit. ■

Between 1990 and 1996 Á. Holport excavated tumulus No. 115, the southernmost burial in the cemetery belonging to the group of so-called **great tumuli**. Although the original height of the mound was about 6 m, at the beginning of the excavation it was only 3 m due to damage from regular plowing. Unique and outstanding architectural remains came to light beneath this tumulus: an almost intact wooden grave chamber with a funnel-shaped corridor built of oak. The bottom of the 5.5 × 5.5 m chamber was paved with stones and a wooden floor of halved oak timbers. The ashes of the dead were scattered on the beaten earth floor of the corridor at the bottom of the mound.

The E-W oriented log walled chamber, due to the smoldering charcoal fill from the funeral pyre, was well preserved, so the museum together with the archaeologist decided to carry out an in

situ conservation and reconstruction programme. With the tumulus reconstruction, the idea of an Archaeological park was born.

The local municipality started buying some land from the owners in the southern part of the huge tumulus cemetery while the museum set up a project to create the in situ presentation of burial mound No. 115 and to build up authentic reconstructions of buildings, hearths, ovens from the Bronze and Iron Ages of Transdanubia.

Conservators, architects and archaeologists worked together to reconstruct the original form of the grave chamber and the shape - spherical calotte on a truncated cone - of the tumulus (*Holport 1996, 1998*). (**Fig. 2**)

The stabilization process for the dry wood was the biggest challenge for the conservators. To prevent the dry timbers from crumbling into powder

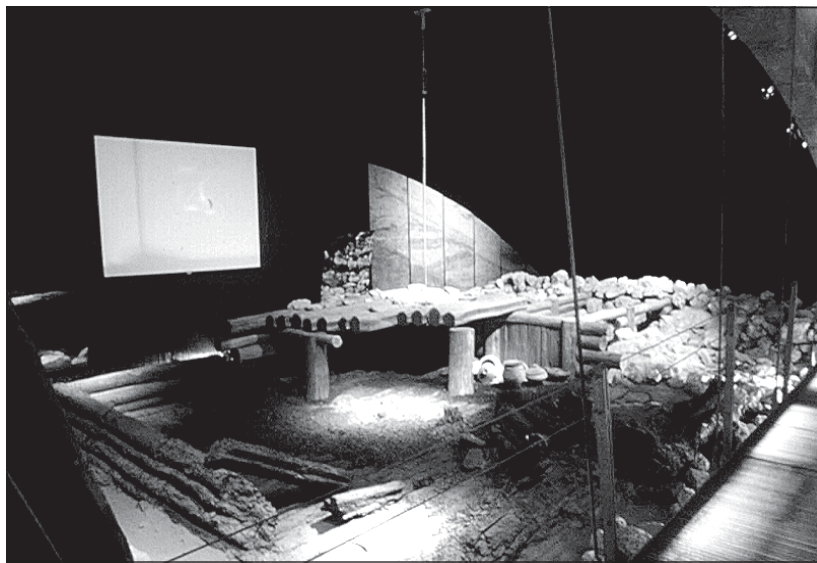


Fig. 3 Inside view of the reconstructed burial chamber. ■ Interiér rekonstruované pohřební komory. ■ Innenansicht der rekonstruierten Grabkammer. ■

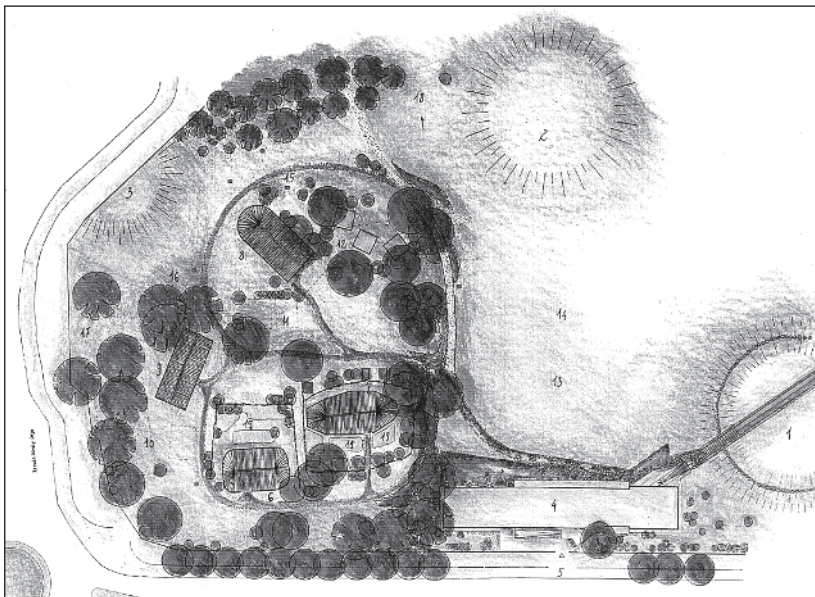


Fig. 4 Bronze Age area in the Archaeological Park. ■ Areál věnovaný době bronzové. ■ Abteilung für Bronzezeit im archäologischen Park. ■

they had to be strengthened with different chemicals. The conservation process - called an experiment - was worked out and led by the chief-conservator at the Hungarian National Museum.

Parallel to excavation and conservation **the architectural (re)-construction** continued as well. The reconstruction very much took into consideration the archaeological aspects as well as that of monument preservation. The E-W oriented tumulus can be visited from a west to east direction to demonstrate that it is an alien process. The architects considered it very important to use the most modern material (concrete and steel) to contrast with the original materials of the tumulus (wood and stone). Inside, the tumulus is divided by a corridor which

runs parallel to the original funnel-shaped corridor. From a steel bridge, the visitors can see the circular space around the inner stone-packing, which is covered by an arched shell-vault and includes the reconstructed burial chamber. The structure around the burial chamber is painted black to make it invisible and highlight the display (**Fig. 3**).

This spectacular presentation has a definite order: a 10-minute-long film concerns the site, life and burial customs of the Hallstatt culture, then an 8-minute-long presentation with sound and light effects shows the building process of the burial chamber and tumulus No. 115 itself.

The goal - to create an understandable and attractive framework for visitors, which is more than a simple

exhibition of the assemblages in a museum - has thus been realized.

Prehistoric life is also introduced to the public within the 6 hectar area in two units. In unit 1 Bronze Age house reconstructions are being built (**Fig. 4**) while in unit 2 we are reconstructing structures from the Iron Age (**Fig. 5**). We do not intend to create

„a village” but by using original groundplans from excavations, (re)constructions of actual prehistoric houses, pits, outbuildings are being built. The so called living areas are separated by wattle fences.

In the Bronze Age area, houses and ovens can be found together with pottery kilns in which smelting, casting

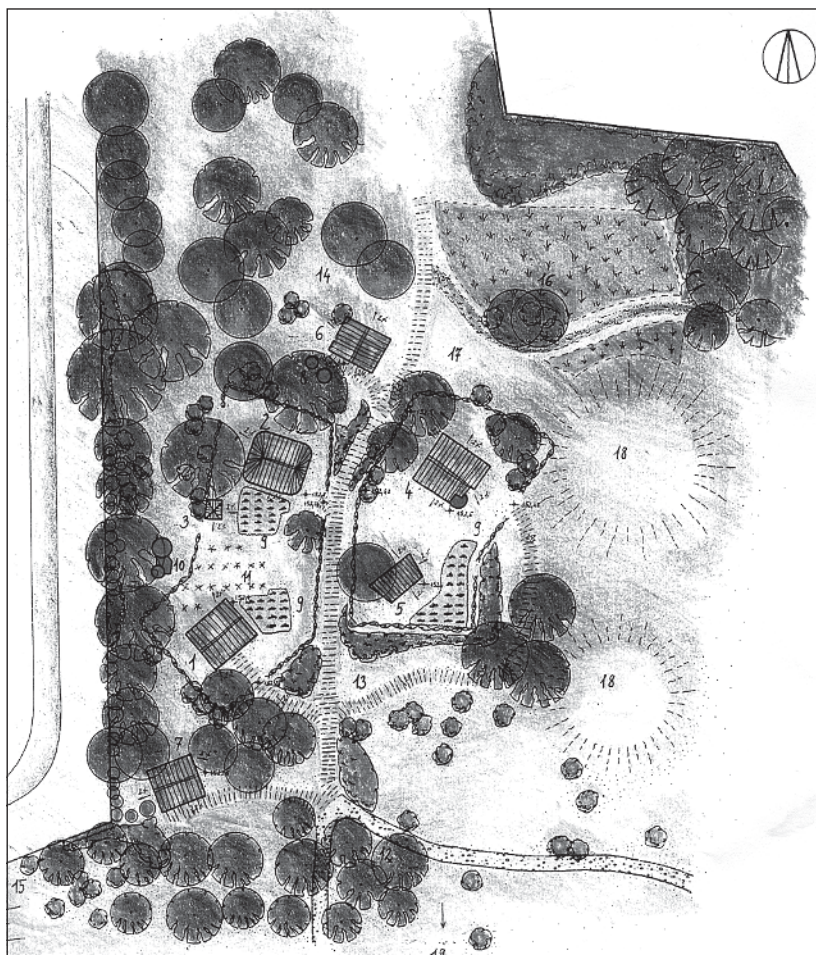


Fig. 5 Iron Age area in the Archaeological Park. ■ Areál věnovaný době železné. ■ Abteilung für das Eiserne Zeitalter im archäologischen Park. ■

and pottery experiments and displays are carried out (*Poroszlai 1999*).

Archaeologists, ethnographers, a potter and visitors were involved in a **pottery experiment**. The goal was to try out different techniques such as the so-called rolling method where the rolls of clay were flattened and smoothed. A third technique involved beating a single mass of clay by hand so that its center became deeper and the outer walls were pulled up. Three small cups, a jug, a dish and a larger urn were chosen from the Bronze Age collection of the museum in order to make copies.

Three different types of clay were tried by the participants: the local clay was not suitable for making pots which means that the people living on the nearby Bronze Age tell settlement had to get their clay from somewhere else, for example from Érd, close to the Iron Age fortification. This clay was better quality while the potter's clay was the best.

Painting technics and graphite glazing was tried out too.

To fire these pieces a grated oven reconstruction was built up copying the oven found on the BA tell site Koszider level. After the excavation our main question concerned the function of the oven. The results of both X-ray diffraction analysis and thermoanalytical investigations proved that the samples taken from the grate of the oven had been effected by a heat of around 700 °C. This means that the oven have been used as a cooking or a potter's oven.

The next step was to rebuild the oven in the park. It was constructed on the ground floor, its bottom was plastered with sherds and its walls were made of clay mixed with chaff and

manure (**Fig. 6**). The firing process took about 8 hours, the maximum temperature was 840 °C which was too high for this thin-walled oven, consequently the wall cracked. Without reduction been achieved the pots became red and yellow, the graphite glazed pots failed though and the graphite disappeared.

In Summer 2002 another firing experiments took place in the Park. The goal was to (re)create the very typical MBA black burnt pottery. The most successful result was when a slow firing process, with straw, bast and dry horse dung was used. All the time we attempted to decrease the oxygen level, so a lot of ash and smoke was created. After 5 hours at a temperature of 796 °C reduction was started with dung, the stoke hole was then closed. One hour later we closed the oven and the temperature went down to 220 °C. The oven was opened 2 days later: inside a lot of ash and charcoal covered the pots which had become black and polished on the surface (**Fig. 7**).

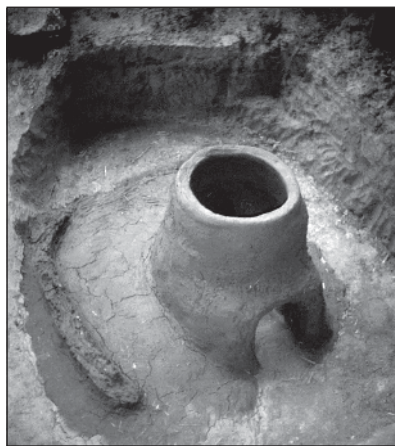


Fig. 6 MBA grated oven (reconstruction). ■ Rekonstrukce pece s roštem (stř. doba bronzová). ■ Rekonstruktion eines Rostofens. ■



Fig. 8 Results of dying experiments. ■ Výsledky experimentů s barvením. ■ Ergebnis eines Färbenexperimentes. ■



Fig. 7 Black polished pots after firing experiment. ■ Černé leštěné nádoby po experimentálním výpalu. ■ Gefäße mit der schwarzen Politur nach einem Ausglühenexperiment. ■



Fig. 9 House No 2 (from EBA Nagyrév culture). ■ Dům č. 2 (starší doba bronzová, Nagyerevská kultura). ■ Haus No.2 (frühbronzezeitliche Nagyrév-Kultur). ■

A textile experiment project

also started this year. In spring dying plants were collected for dying: willow-twigs, nettle, elder-flower and leaf, elderberry, Hungarian fustic, nuts etc. Dying liquid was made by cooking and steeping. The steps in the colouring process as follows: washing, cooling, mordanting, colouring, cooling, drying, washing, drying. Different colours were created using different mordants and plants (**Fig. 8**).

House building experiments:

Houses No 2 and No 3 are the most important Early Bronze Age reconstructions in the park. Each has a small garden surrounding it.

House No 2: Early Bronze Age house from the nearby Bronze Age tell site (level 6, Nagyrév culture).

Observations during the excavation: The structure was a two-roomed, north-west-southeast oriented building with

wattle-and-daub walls. Because it had burnt down, the floor was covered with a thick layer of charred debris. The southeast half of the house comprised a rectangular room with rounded corners. The floor here was 20 cm deeper than that of the neighboring room which was only partially excavated as it extended beyond the limits of the excavation trench. The two rooms were divided by a thin wall. The northwestern room yielded few artefacts but its floor was nicely plastered so we considered it the living room. (*Poroszlai 1996, 1999b, 1999c*). In the other space were cooking pots, a fire place, and a work pit indicating that this was probably a room where food was prepared (kitchen?).

The 10-15 cm thick walls were preserved to an average of 10 cm in height. Only one big post hole came to light from within the building - one of the main posts which held the purlin.

A reconstruction plan was worked out by the excavator (*Poroszlai 1999b, c*). The house is two-roomed, with clay walls and a plastered floor. Its dimensions are $10,5 \times 6$ m, as reconstructed from the excavated part. The building has a hipped roof with rounded corners (**Fig. 9**). The roof is supported by a line of posts outside the wall and by the side purlin since the thin walls could not have played an important role in carrying the weight of the roof.

House No 3: Early Bronze Age house from the Szigetszentmiklós rescue excavation (Bell Beaker Culture)

Observations during the excavation: A boat-shaped, post structure, northwest-southeast orientation with slightly curving walls and an apse. Two pits containing Bell Beaker pottery were found inside the house (*Endrődi 1992*). The excavator has postulated that these are storage and cultic pits.

The reconstruction was easy, based as it was on 51 post holes which came

to light during the excavation. The entrance was indicated on the south side by an absence of post holes. The size of the building was 16×6 m. There was no hearth or oven inside, so the excavator proposed it was a public house for special rituals or activities.

According to the average depth of the post holes - 10-50 cm - we believe that the original floor level was never found. This level had probably been destroyed by agricultural activity or severe floods. A geometrical study of the ground-plan demonstrates that the southern section of the building, with the apse structure, belonged to the original building and was built at the same time. Therefore a boat-shaped, timber-framed, gabled roof and wattle-and-daub building with a straight roof crest or ridge was built (**Fig. 10**). There is a hipped roof above the apse.

In both cases oak was used for the main posts and ash for other structural elements. All the rafters and other supporting structures were fastened

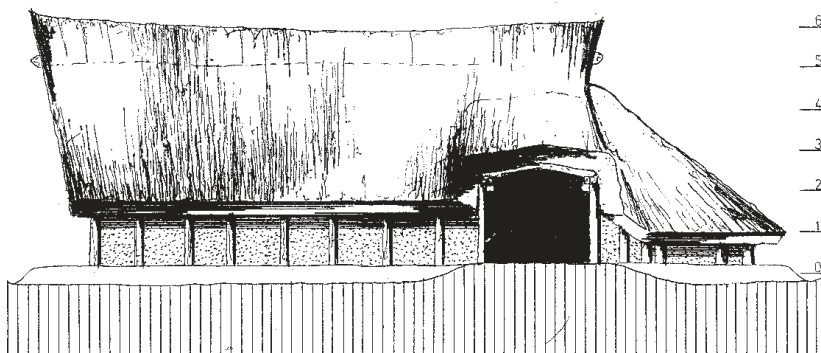


Fig. 10 House No 3 (from EBA Bell-Beaker culture). ■

Dům č. 3 (starší doba bronzová, KZP). ■

Haus No.3 (frühbronzezeitliche Kultur der glockenförmigen Becher). ■

with wooden nails and ropes, strengthened with willow switches. During the building process both modern iron tools and copies of Bronze Age shafthole axes as well as sickles were used eg.: trees were debarked with axes or well curved sickles, shafthole axes with long straight handles were used to dig posts and axes could be used as chisels etc. The building experiments were carefully recorded.

Horse-beans, chick-peas, peas, lentils are grown around the houses in small vegetable gardens. All species planted here were found in the archaeological layers of the nearby Bronze Age tell site (*Poroszlai 2000*).

A large early Tumulus house with apsis is now under construction. The house was revealed 2 years ago by a Bp. Historical Museum rescue excavation.

There is an area close to one of the tumuli where a **prehistoric seed experiment** has been going on since the autumn of 1995. The experiment is based on the experiences of Peter Reynolds who has carried out research for 30 years at the Iron Age Butser Ancient Farm in England (*Reynolds, 1981, 1992*).

As the thousand years old grains are carbonized and cannot be germinated, we started our experiment with the production of emmer (*Tr. dicoccon*) and spelt (*Tr. spelta*) supplied by P. Reynolds from Anatolia. Following his instructions, our experimental work went on under the leadership of the archaeobotanist of the Hungarian Agricultural Museum until 1999 (*Torma 1999*). In 1998 the Agricultural Research Institute of the Hungarian Academy of Sciences (Martonvásár) joined the project, that from 1999 we

could also start with the production of other types of emmer and einkorn (*Tr. monococcum*) supplied by the Cereal Gene Bank of Martonvásár. Through these experiments we would like to reconstruct prehistoric wheat cultivation in as authentic way as possible by trying various methods, observing their workability and time-consumption. We wish to get an idea of how many people could have been fed by a certain area and, how long would it take to exhaust the soil with monocultural wheat production, etc.

According to archaeobotanic remains from the Carpathian Basin both einkorn and emmer played important roles in early prehistory (see Neolithic and Bronze Age sites) while spelt finds are much more scattered. However, spelt finds increase in frequency in the late Bronze and early Iron Age both in the Carpathian Basin and Western Europe.

All the three wheat species selected for production belong to the so-called hulled wheats which have the same characteristics as the more ancient wheat varieties (hulled grains in the spikelet, fragile spike) (*Torma 1999*).

The grain is sowed together with chaff in seedbeds prepared with hoes over an area of 400 m². The distance between the seedbeds is 30 cm. Each plot is sewn with 350 grams of seeds. There is no difference between the manured and non-manured plots because this area has been cultivated for a long time - the soil samples show a high phosphate content.

The growing and developing of the plants is observed and recorded. The meteorological data are also registered. The average height of both emmer (*diciccon*) and spelt (*spelta*) is

between 55 and 135 cm before harvest which is in about late July, early August. Harvesting is done by hand or with a bronze or semi-lunar flintstone sickle. From each parcel samples are taken with measure length, weight of spikes, number of spikelets, grain and kernel weights. The land yields a heavy crop: on average a 20 fold harvest. Archaeobotanists think that about 8-10 years of research will be needed to obtain good, comparable results.

Several threshing methods were tried and a wooden huller proved to be the most efficient. The threshed spikes can be easily separated from the chaff by fanning. Grinding is done by hand with mortar stones. Pies made from spelt flour can be sampled by visitors to the park.

The wheat surplus is stored with the chaff in metal bins.

In the northern area of the Archaeological Park in 2001 **the Iron Age reconstruction project** started. Here farmsteads from different Iron Age periods are being built, based on the excavations of Sopron-Krautacker, where a variety of houses, out-buildings, economic and industrial features were revealed by E. Jerem (*Jerem, 2001*). (**Fig. 5**)

In 2001 the **construction of the central unit** started with two houses dating to the 5th century BC. The so called weaver's house (revealed in Sopron Krautacker) was finished last year as the building remains were extremely well preserved and recorded. The daub fragments offered a lot of information on how the wood – used in the wooden structure – was worked and the tools used. Charcoal analysis proved the use of oak. Traditional techniques were used – such as scarfing

and mortising – for joining the structural elements. Wooden nails and rope were used for securing the rafters. The wall is of a wattle-and-daub type (**Fig. 11**).

Postholes marked the position of an internal dividing wall in the eastern part of the building. He loom weights and spindle whorls came to light near this dividing wall.

The other house was finished in 2002, the material of the wall structure is unknown as no remains came to light during the excavation (Sopron-Krautacker, house 111). A massive clay-earth wall is supposed without an inner framework which probably disappeared during the destruction of the building. The archaeologist and architect decided to rebuild this house with a mudwall made by clay, mud, chaff and dung.

In contrast to the Bronze Age area, the Iron Age „settlement” will be presented by the (re)construction of various economic units.

The reconstruction of MBA and IA environment and cultural landscapes is an unusual challenge not only in Hungary but also abroad.

Using the results of oecological researches and pollen analysis (*Müller 1996, 2002, Sümegi-Bodor 2000*) an **environmental reconstruction project** has been developed to replant the characteristic vegetation of the Bronze- and Iron Age and to provide a reduced reproduction of the former prehistoric landscape in the Archaeological Park (*Poroszlai 1999b*).

Our present day climate is very similar to the subatlantic climate of both the Middle Bronze Age and Early Iron Age which means that oak forests advanced at the expense of beech.

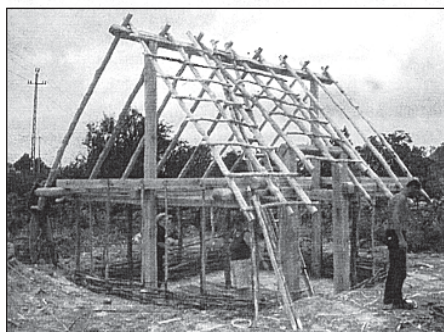


Fig. 11 Weaver's house reconstruction. ■ Rekonstrukce domu tkalce. ■ Rekonstruktion eines Weberhauses. ■

Since 1997, several trees and bushes such as maple species, oak species, ash, elms, cornel, haw, sloe bushes have been planted. In this phase of the reconstruction the main goal is to replant the original grasses and create a woodland. Fruit trees have also been planted on the edge of the forest including: crab-apple, hazel, bramble-berry, walnut, wild plum and, elder.

The Százhalombatta Archaeological Park is already a center for experimental archaeology and education on the one hand and an activity park on the other. It can be used by archaeologists to carry out various experiments as well as to test ideas and hypothesis derived from the results of different excavations and empirical observations. At the same time, it can be used by teachers to inform students about prehistoric lifestyle, handicrafts and ancient agricultural methods.

We work together with several people such as archaeologists, ethnographers, anthropologists, potters, weavers, conservators, architects, botanists, horticulturists and teachers because we are convinced that long time projects and results can only be achieved only together, using each other's experiences and knowledge.

Our next plan is to build up a reception and working building to guarantee full year opening hours for visitors. In this building there will be a permanent exhibition hall, auditorium, workshops, storages etc. In the near future our main task is - aside from the experimental projects – to reach the financial stability needed to build up all the missing architectural units and continue the environmental reconstruction.

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Summary

Archaeopark Százhalombatta, Maďarsko

V areálu mohylníku z doby železné, kde se na ploše 5 ha nachází největší a nejzachovalejší mohyla v Maďarsku, vzniká první maďarský archaeopark. Mohyla č. 115 byla zkoumána v letech 1990-1996. Mimořádný nález dřevěných částí (hrobová komora atd) stál za konzervaci in situ, rekonstrukci a zprístupnění veřejnosti.

Od roku 1996 jsou v areálu prováděny různé experimenty: (re)konstrukce domů doby bronzové a železné, experimenty týkající se keramiky textilu a pěstění. Dnes je zde možné navštívit 4 domy z doby bronzové a 2 domy z doby železné. Od roku 1997 dochází k rekonstrukci přírodního prostředí vysadbou původních rostlinných druhů.

Der archäologische Park Százhalombatta in Ungarn

Im Grabhügelgelände aus der Eisenzeit entsteht das erste vorzeitliche Museum unter freiem Himmel in Ungarn. Hier kann man auf der Fläche von 5 ha den grössten und am besten erhaltenen Grabhügel finden. Der Grabhügel No.115 wurde in den Jahren 1990-1996 erforscht. Die erhaltenen Reste der holzernen Grabkammer wurden *in situ* konserviert, komplett rekonstruiert und dem Publikum zugänglich gemacht.

Seit dem Jahre 1996 verlaufen verschiedene Experimente im Gelände: Bau und Rekonstruktion der Häuser aus der Bronze- und Eisenzeit, Experimente bezüglich Keramik, Textil und Pflanzenanbau. Heute stehen hier 4 Bronzezeithäuser und 2 Eisenzeithäuser. Seit dem Jahre 1996 wird die natürliche Umwelt durch den Anbau der ursprünglichen Vegetationsarten rekonstruiert.