Reconstructions of Medieval pit-houses

Die Rekonstruktion des mittelalterlichen Grubenhauses

Reconstruction des cabanes enterrées médiévales

Tibor Sabján

During the examination of pit-houses used in the Arpadian age it became clear that in preparation for the reconstruction of a certain structure, it is not enough to get acquainted with and interpret the find given, but we have to have a general grasp of the problems of pit-dwellings in that era. Learning from the mistakes of earlier approaches, we conducted our research along two main lines: the analysis of sizes, and structural questions. Without having a clear view of these fields we could not even begin to make plans for reconstruction.

For the analysis of measurements we chose a 3-by-3-meter pit-house, considered typical (*Fig. 1*). If, according to the traditional interpretation of pit-houses, we put a roof of square pitch on the edges of the pit, its highest point will be 150 cm above ground level. The first question now is: How to get in? In case of a side entrance the small covered entryway rises above the roof, its measurements of height are larger than those of the house. In case of entry from the end the situation is even worse as in the gable wall, 150 cm high in the middle, the door can only be positioned at one side of the Y-shaped upright. Thus, if the house has no sunken entry it can only be entered on all fours through the small door. When analysing the space inside we also encounter considerable problems. Suppose our house is sunk 60 cm deep into the ground. In this case the full internal height of the structure, (leaving out of consideration the thickness of its roof beams) will be 210 cm. A grown man (say, 175 cm tall) can stand erect under the ridge pole but the moment he takes step to the side his head will hit the roof. And he can only get near the oven in the corner on his knees. Looking now at the ground-space of the home once more the lack of room is conspicuous. After deducting from the 9-square-meter ground-space the area occupied by the oven, the stair-treads to the door and the room taken up by the uprights (in many cases there is one in the middle, too) there remains scarcely any surface available for storage and resting places. The situation is further aggravated if we consider excavation results pointing out that in such dwellings embers were often spread in the middle of the floor. Now it is unimaginable for more than one or two people to be in the abode at the same time.

The problems emerging from the analysis of structural and static questions are not less difficult. It can readily be realized that the heavy burden of a roof, covered with earth, cannot be carried by the edges of a pit, nor even by the ground in their close proximity, as earthen edges crumble easily. The danger of falling in threatens the constructions, too, whose dug-out oven protrudes beyond the ground-space of the house. The thin layer of earth over the oven could not bear the weight of the roof, leaning on it. In respect of such houses it is out of the question, as a matter of course, that the roof could have been borne by the ground immediately surrounding the pit.

Having examined its measurements, we may conclude that the house of 3 by 3 m, we have taken as an example, is, on account of its parameters, scarcely habitable, and is simply not big enough for a family.

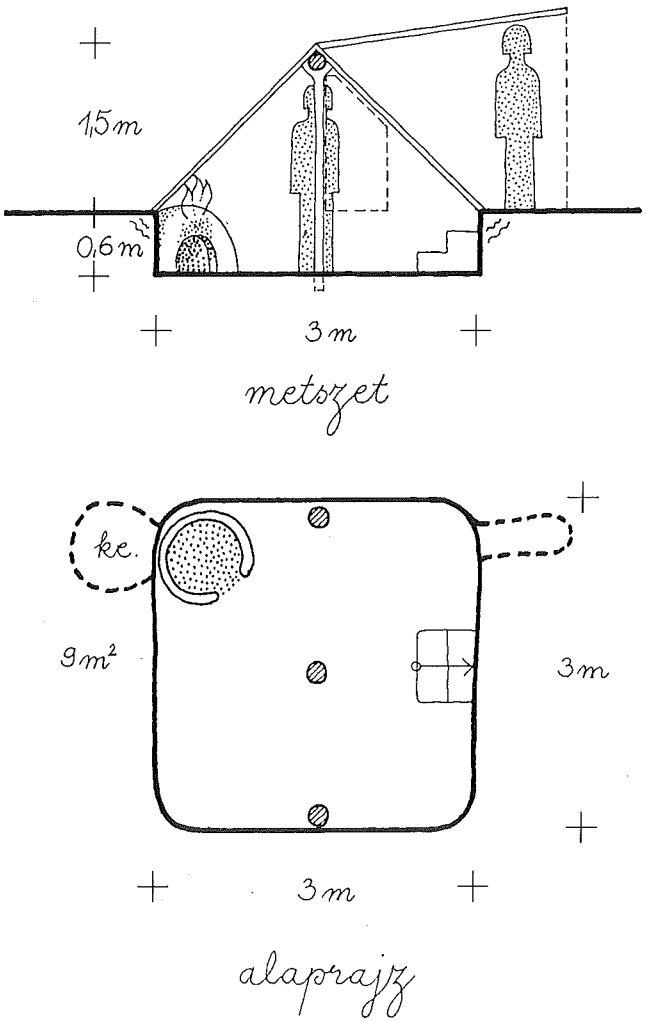


Fig. 1. *The analysis of structure and measurements of a pit house according to traditional interpretation (Drawings by T. Sabján).*

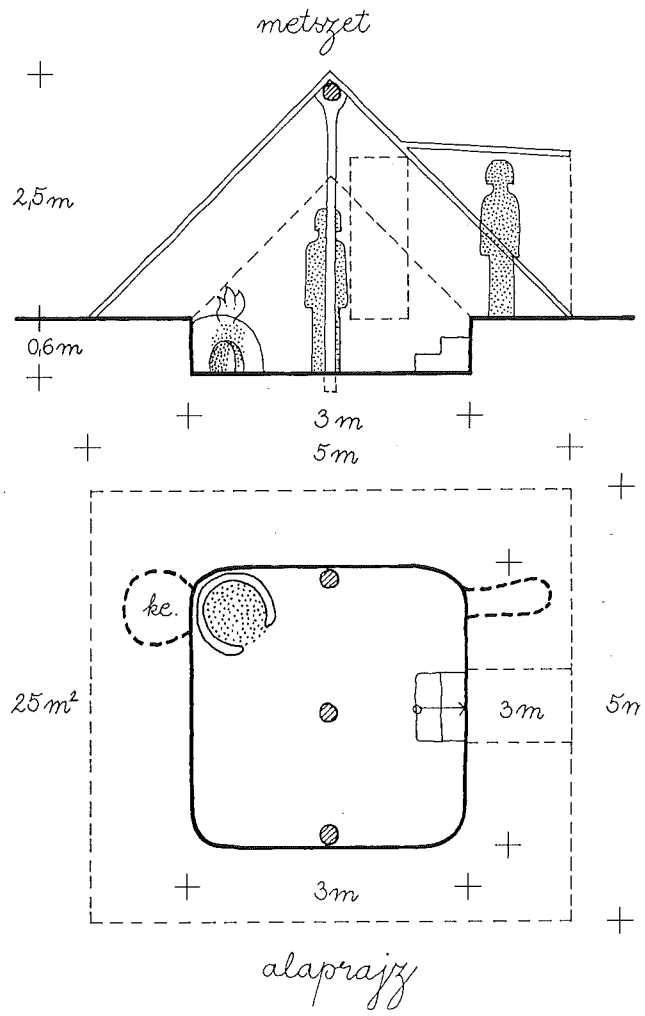


Fig. 2. *The new interpretation of the pit house. An analysis of structure and measurements.*

Yet dwellings with 3-metre sides seem to be the average, i.e. there were even smaller pits. In the territory of the Páka Várhegy the traces of a dwelling not bigger than 2.2 by 2 m, and at Tiszalök Rázompuszta another, measuring 2.2 by 2.2 m, came to light (*Molnár - Vándor 1982-83*, 111; *Méri 1952*, 58). In was impossible to stand in them, as, presuming a 45-degree roof, their internal height was less than 170 cm. And until now we have not even thought of what might have happened when there was fire in the oven. How could a man - feet on ground and head touching the ridge pole - avoid the smoke?

Reverting to structural problems, one of the key points of reconstruction in principle was that the roof cannot be put on the edge of the pit, it has to transfer its weight to the ground a little farther off. Excavation finds give us no information on the part of superstructure that was in contact with the earth, i.e. do not prove or disprove either proposition. Imprints within the pit would be the same in either case. Thus tangible archaeological finds do not restrict us. Taking into account strongly protruding ovens, too, the distance of the lower end of the roof and the pit can even be 1 m. In this case, however, keeping the square pitch of the roof, we face a house of a new quality, with useful spaces outside the pit (*Fig. 2*). Keeping to our example, 1 m is added on each side to the 3 m width of the pit, so the house will be 5 m wide. The roof will reach the 2.5 m height, and the highest vertical inside measurement the 3.1 m. Entry is easy either through a roofed entryway from the side or through a door under the gable. A man within the abode can step to any side of the pit without knocking his head on the roof. Above a standing adult there is enough headroom where smoke can collect and still the inhabitants need not escape. With regard to ground-space, as compared to the 9-square-metre floor of our former idea of an average pit-hose, the built-up area will now be around 25 sq m, corresponding to a normal size peasant room. This interpretation of the pit house solves all the problems arisen in connection with the former model. The oven, e.g, constructed in the corner, seemed an expressly disturbing device, as flames shooting out of its mouth might easily have set the roof alight. Now the roof is about 2 m above the oven-mouth so the threat of inflammation to the house is eliminated. The strongly protruding dug-out oven causes no static problem either, it may not even take in water, as it is within the house, protected by the roof. Irregularities in the pit-side, arching or uneven edges, a non-rectangular pit or a post standing askew, almost diagonally, are of no special concern any more, as the sloping roof is, to some extent, independent from the pit and its edges respectively.

Naturally, the first and foremost question of the new interpretation of the pit house is what proofs we can enumerate to support our assumptions. (As it is not part of the answer, we only mention in brackets, that there is no evidence in support of the traditional theory that presumes that pit and building have the same ground-space.) Archaeology helps us with little data of conclusive force, as the technique of excavation according to which digging up the house begins after the shape of the pit has shown up against the ground, stripped of its top-soil, cannot yield any information on the surface around the pit. In the majority of cases the archaeologist cannot be blamed. The original surface is usually close to the present one, both are mixed with humus and often also with each other, so its position cannot even be determined. Thus we have no direct archaeological proof, but excavations do offer a few indirect ones. From the logical point of view we may discern 3 principal cases according to the position of the Y-shaped posts bearing the roof, with regard to the sides of the pit. If the upright stands within the pit or in its side the borders of the house may be identical with that of the pit. If, however, the Y-shaped upright is outside the pit then the end wall of the construction has also to be outside, otherwise the frame that bears the building will stick out therefrom. Houses with posts outside the pit - in which we are now interested - are rather rare but existing. The uprights and also the oven of the pit dwelling, excavated in the Kenderföld meadows at Balatonszentgyörgy, were positioned outside the pit (*Müller 1972*, 197-99). Among the buildings of various types revealed by the Visegrád-

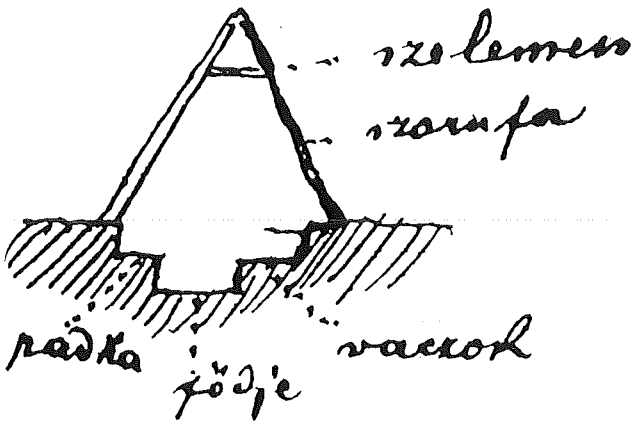


Fig. 3. *Ottó Herman's sketch of a fishermen's hut in Nádudvar. (Cutaway view).*

Fig. 4. *Ottó Herman'a perspective drawing of a fishermen's hut in Nádudvar.*

várkert excavations, another pit house with outside posts has been uncovered (Júlia Kovalovszki's unpublished account).

Folk architecture provides more examples than the scarce finds of archaeology. The principle, we applied, has mainly underlain the construction of temporary shelters and huts. Among these structures there are several kinds with sunken floor and roof leaning on the ground. Looking at them it is not difficult to recognize the survival of the tradition of pit houses common in the Arpadian age. For the nicest examples we are indebted to Ottó Herman. During his 1898 collecting tour in Nádudvar his attention was attracted by the fishermen's hut, called *kastély* (castle). He made of the sunken structure a sectional drawing, a perspective drawing and an explanatory scenograph (*Csilléry 1970*, 65, 7-8) (*Figs. 3-4*). The hut was 3 m long, with an entrance cut into the gable wall made of reed. The rafter roof was also covered with reed. Along the banks of the brook Kövi there must have been more than one such abode as Ottó Herman remarks that one of them was plastered inside with mud mixed with chaff. In the scenograph a fisherman can be seen sitting on one of

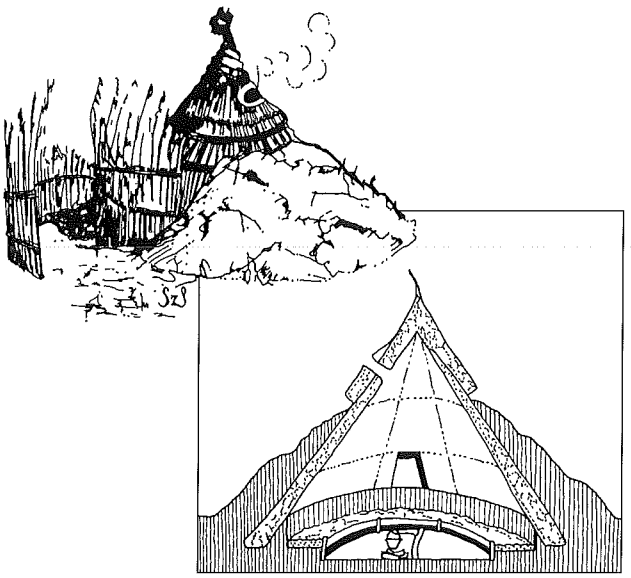


Fig. 5. *View and section of a swineherds' hut at Nagy-sárrét, as described by the herdsmen (according to Szücs 1940, 152-2).*

the ledges smoking his pipe whereas his mate lies on the opposite ledge. Between them a fire is burning on the floor.

The swineherds of Nagysárrét also constructed huts, dug into the ground, but their conical shelters of reed had a round ground plan (*Szűcs 1940*, 152) (*Fig. 5*). The severe winters they spent in these structures, in other seasons they only kept their food and clothing there. The hut was so big, it would have made a small house, still it barely jutted out of the ground as its floor was sunk 1à m deep. That's why it could happen that members of the Báránd parish council almost lost their way during an inspection round in 1829, when they "were guided in the enormous snow by the smoke from the hut". Inside the round structure they cut with spades low, but wide ledges around the wall, spread them with reed, then made resting-places of sheepskins and fur coats. The inside walls they plastered with mud mixed with chaff. A fire burnt all the time in the middle serving for heating, cooking and lighting. The smoke escaped through a hole cut into the reed at

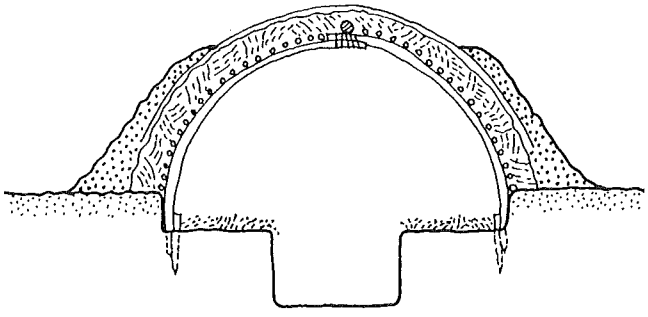


Fig. 6. *View and ground plan of a round hut in the vicinity of Debrecen (Ecsedi 1912, 165-6).*

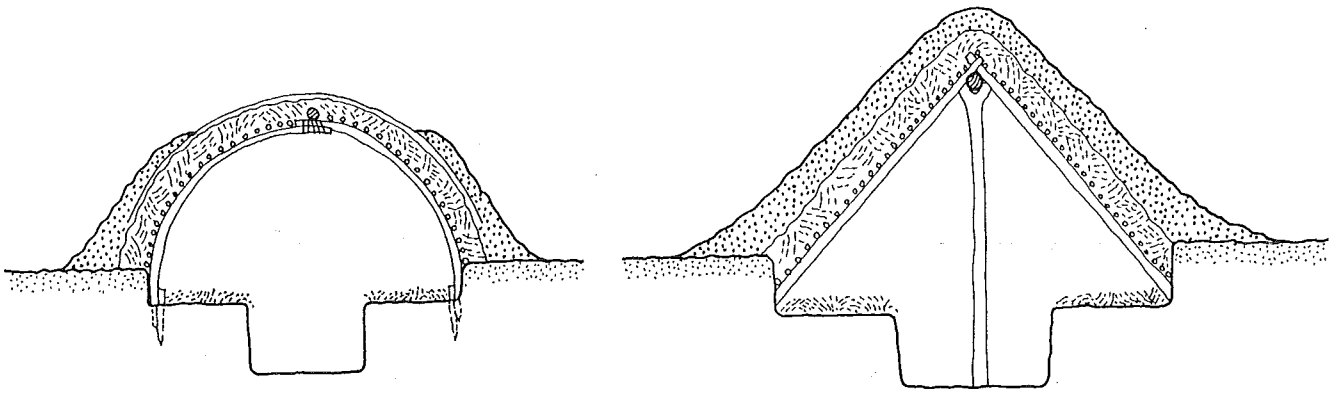


Fig. 7. *Cross sections of two navvies' huts, as described by Imre Katona (according to Katona 1962, 25-28).*

the peak of the hut and carefully plastered. The earth, dug out when making the pit, they shovelled onto the sides of the construction, of which finally only the peak was visible. The low and narrow entrance always faced south and was protected from the adversities of the weather by a reed wall.

Shepherds and cattle-herds who found shelter for the winter on the fringes of Debrecen and, in later times, wood cutters and poorer forest labourers also erected round huts, so-called peaky top covers (*Ecsedy 1912*, 164-65) (*Fig. 6*). The frame of the construction comprised 4 large tree-trunks. The upper ends of these timbers, leaning against each other, were then tied together with a bond of young oak withy then shorter poles were lain at the sides, close to each other. This structure was covered with a layer of forest litter or straw, à m thick and, finally, with sandy earth. In the peak of the roof they left an opening, sometimes covered with an old basket or bee-skep, for the smoke to escape. The entrance was protected by a small covered entryway which had a ladder-frame door interwoven with twisted straw. Within the hut there were U-shaped ledges reinforced by wattle. Straw spread on the ledges served for bedding, and a fur coat as blanket. There were no windows, a fire burned in the middle of the floor.

Navvies, too, built semi-subterranean temporary shelters for themselves. "As soon as they arrive in their place of destination, each will construct a separate hut for himself, half in, and half above the ground. The roof they cover with twigs and sods", reads the report in a 1879 issue of the Vasárnapi Újság (Sunday News). More detailed ethnographical research revealed that while smaller hovels accommodated 1 or 2 people bigger ones for 3-4, even 5-6-7-8-10 or 12 persons were also erected (*Katona 1962*, 19-29) (*Fig. 7*). The entrance to huts that could sleep 3-4 people was at one end, to ones for 6 in the middle, and to the biggest on both ends. First they cleared the place for the hut, then dug down to a depth of 30-60 cm. In the middle they made another 50-60 cm deep and 70-90 cm wide trench. This was to be the floor and the ledges of 50-80 cm width, left on both sides, became the beds. For the small huts they prepared semicylindrical roofs of bent poles bound together with withy and covered with rush-matting or canvas. For a big shelter they set up a purlin roof on Y-shaped posts then covered it with foliage, reed, sedge, grass or straw and strewed thickly with earth. The end walls were of wattle filled in with earth or covered with boards. Winter quarters were sunk 1 m deep and covered with stronger materials. They placed the rafters closer to each other and sometimes surfaced the roof with sods. Each winter hut was heated with a cauldron or iron stove. Only family huts could boast with an inside plastering; it was the women's work. They slept on the earthen ledges on straw or hay bedding wrapped in their *shubas* (wide sheepskin coats). Sometimes a board, set on edge, was placed at the side and end of the ledge to keep the straw from scattering.

When the marshy soil permitted, cowherds in Nagyberek (Somogy county) sunk their huts by the pen two or three spits deep into the ground (*Takács 1986*, 86-88; ....87-VIII). When the water table was high they dug only 1 spit deep and the earthen ledges left on both sides were just a little above floor level (*Fig. 8*). The ground plan of the open fronted structure was triangular, the two sides of the V-shaped ledges served as beds and the back corner as storage for the herdsmen's belongings. The earth dug out of the ground they threw on the roof then fixed this cover with sods. They made fire in front of the mouth of the hut. Herdsmen, grazing cattle at the Berekfás well, who only set up a roof against the rain, had a similar shelter. The difference was that they did not sink the floor but only dug a pit for their legs to be comfortable when sitting in front of the hut (*Fig. 9a*). The purlin of the structure was supported on a trestle in front and leaned on the ground at the back. The roof was covered with sedge and peat. They dug a 3-spit-deep ditch around the shelter so that the cattle should not bang into it and cause its collapse. The earth dug up, they threw on the outer side of the ditch. The swineherds of Nagyberek also constructed a round hut of sunken floor for themselves. They left an L-shaped ledge of earth in the conical abode of reed. The long part served as bed and the shorter one as seat. The structure was plastered on the inside (*Takács 1986*, 98 *Fig. 9b*).

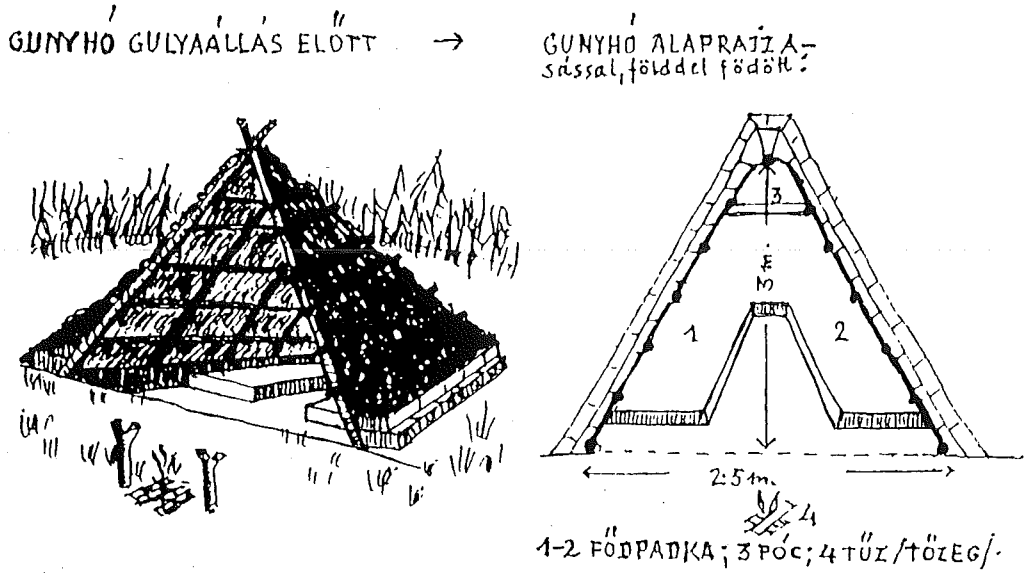


Fig. 8.
The triangular hut of Nagyberek cowherds; view and ground plan (Takács 1986, 87, VIII).

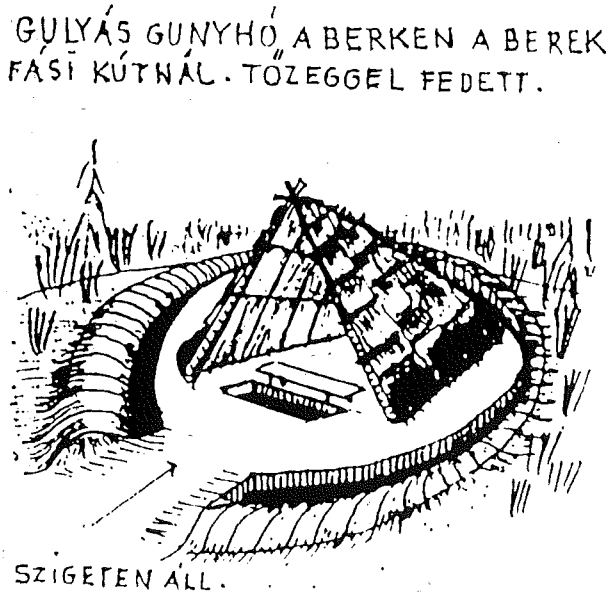
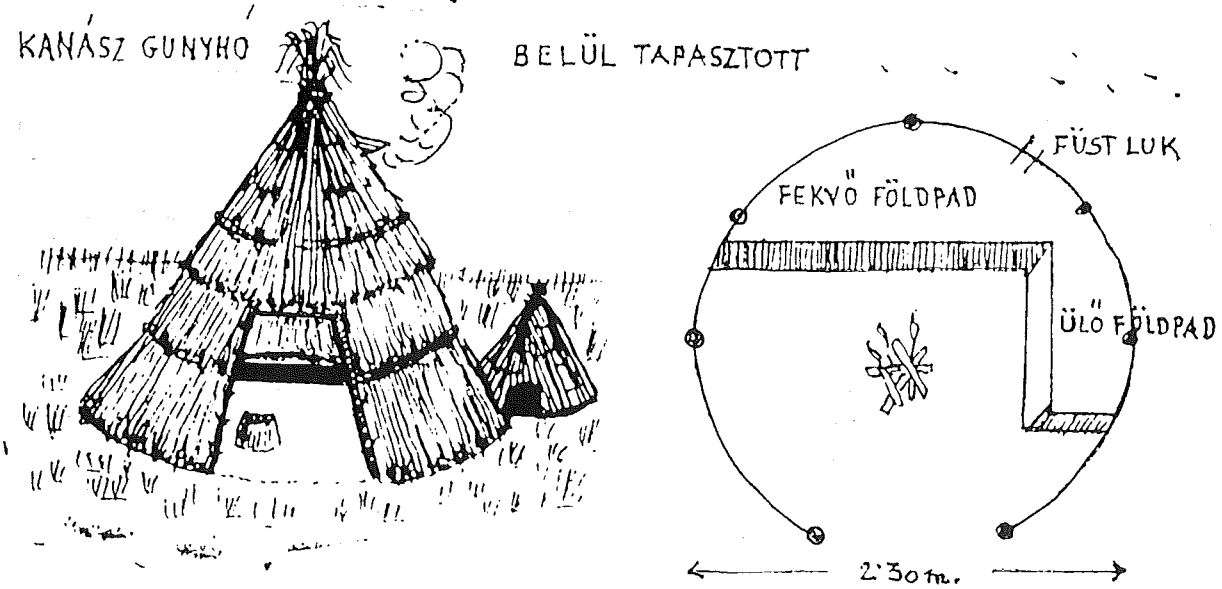


Fig. 9.
The hut of Nagyberek cowherds and swineherds (Takács 1986, 98, II).



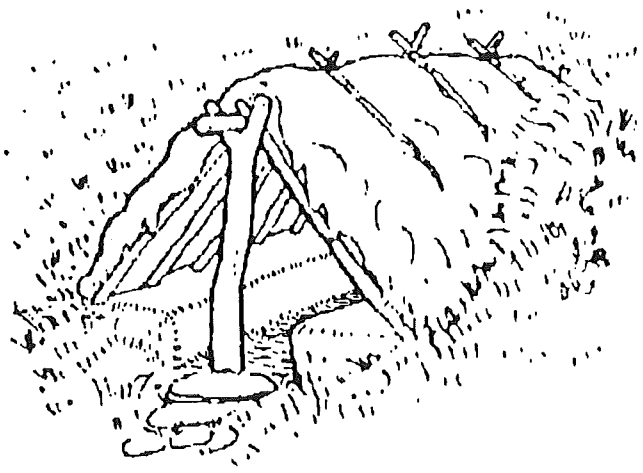


Fig. 10. *Vineyard labourers' hut sunk into the ground at Sztána (Kalotaszeg) (Kós 1994, 62-12).*

The temporary huts used by melon-farmers and tobacco-growers also belong to the ones sunken into the ground, without, however the wide ledges fit for sleeping on. These shelters of rectangular ground plan are made with a floor, 2-3-spit deep. Boards or acacia cudgels are nailed or bound with withy at small intervals to the rafters then straw is scattered in a thick layer on the roof and earth is spread, again thickly, on top. Although there is a narrow ledge at the side of these structures they are furnished and the occupants sleep in beds.

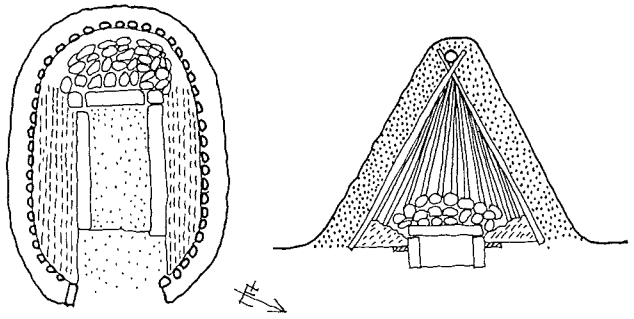


Fig. 11. *Ground plan and cross section of a Finnish miilukopin (according to Sirelius, U. T. 1921, 147, 164).*

Pits for various purposes are also made over holes, dug into the ground, and with rafters received by the ground beyond the edges of the hole. At Szalafő in Western Transdanubia people construct storage pits reminding of a small house, with rafters lying side by side in the roof under a layer of earth. The rafters are held by middle- and side-purlins. In more than one point of Hungary men working in the vineyards erected for themselves shelters with sunken floor under a roof leaning on the ground. The huts covered with reed or earth were either open in the front or closed with a door. There were ledges along the sides on which they could also rest (*Kós 1994*, 62, 12) (*Fig. 10*).

Reverting to the shelters of sunken floor and side ledges for resting, we can see that their occurrence is not limited to the Hungarian linguistic area. The Finnish *miilukopin* was erected on an oval ground plan and its roof was constructed of rafters leaned against one another (*Fig. 11*). One of the specimens was 2.2 m wide and 4 m long, with an inner height of 1.7 m. The centre of the hut was sunk and the edges of the resulting ledges were shored by flat stones set on edge. The oven, built of stones at the back end of the structure, was stoked from this sunken floor (*Sirelius 1921*, 147, 164). Shepherds in the Swiss mountains also raised huts of sunken floor for themselves (*Rütmeyer 1924*, 334, ...166). One of these shelters was 3.75 m wide and 4 m long, with a floor sunk 60 cm deep. The gable roof supported by Y-shaped posts was covered with sods. The Eskimo home, the *igloo*, built of snow blocks, also had ledges inside around the wall. Through the entrance people crawled to the sunken floor, but the family rested and slept on the high ledges (*Attenborough, D.*: The Living Planet, serial film, part 2). Simply producible barracks were set up in the Soviet Gulag camps. Prisoners had to dig a long trench—this was to be the corridor of the barracks—which was then covered by a simple roof. People slept on both sides of the corridor, on the ground. We have to mention at this point that shelters with sunken floors resemble in many respects the huts made with raised resting-places and storage ledges. Both are based on the same principle: resting and storage places are raised from the levels where people walk and work.

In the foregoing we have analysed temporary shelters of sunken floor. There are, however, earth lodges that served as permanent abodes as well as stables whose whole floor was much below ground level (*Dám 1981*; *Kiss 1936*). These buildings have 2 basic types: 1) with walls above ground, and 2) with a roof leaning on the ground. The main structural features of these types are fairly similar, but while the roofs on above-ground walls are mostly covered with reed, straw or tiles, the ones leaning on the ground are almost all the time covered with earth (*Fig. 14*). These dwellings are usually multipartite and the devices of heating and smoke abatement are the same as in the houses erected on surface level. We may even say that these constitute a semi-subterranean version of homes with more than 1 partition erected on the surface. Thus only the stables have features dating from the Arpadian age, still their structural solutions are important for us. The pit of both house types go down to 150-200 cm then lined with some kind of walling. If it is a bearing wall of adobe or brick the crossbeams are placed on top of it. If the walls are weaker (e.g. stakes, stuck into the ground, or wattle) and are only fit for lining, or the pit is unlined, then the crossbeams are borne by Y-shaped uprights stood in the side of the pit. The long Y-shaped posts supporting the ridge purlin are dug in at the axis of the pit. Where the roof was covered with earth, its weight had to be also supported by uprights in the middle of the room. These houses usually had open roofs, the rafters lay on the ridge pole and the crossbeams. The distance between them depended on the roofing material. In an earthen roof

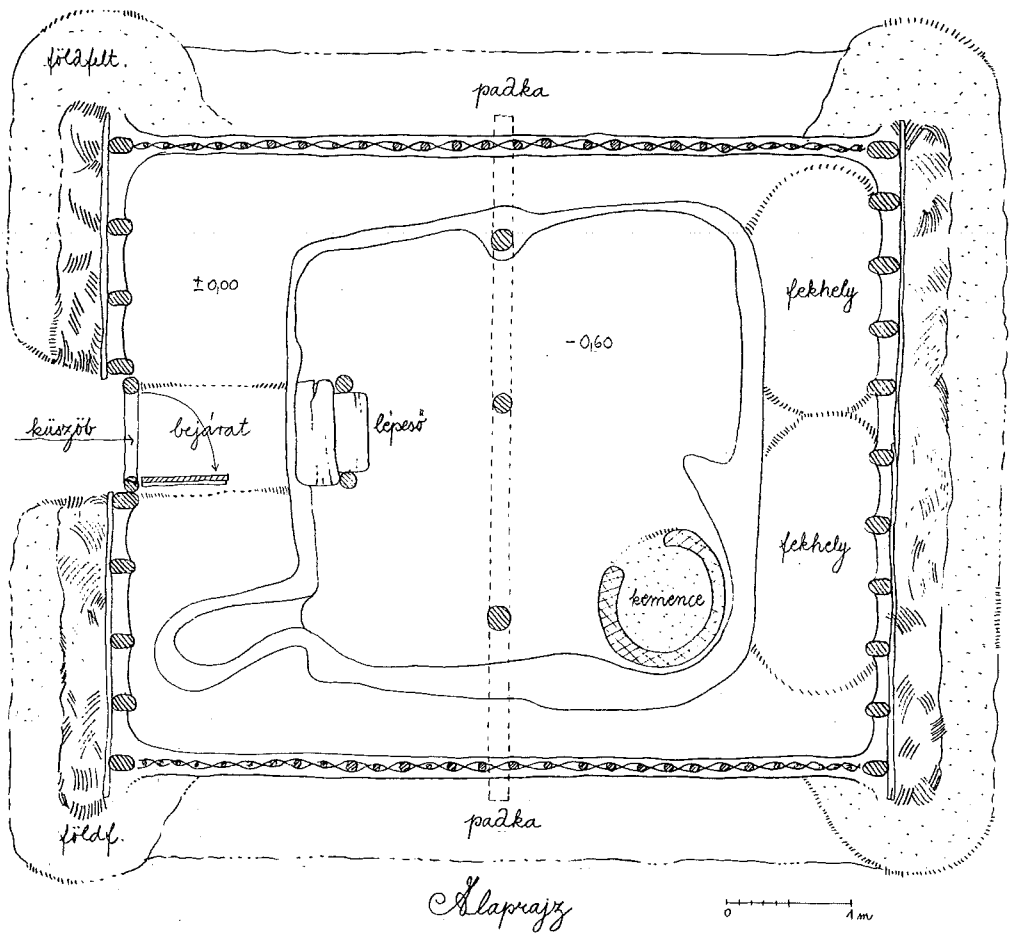


Fig. 12.
Ground plan of the reconstructed pit house No. 363 (plans by T. Sabján).

they could be as close as à m. If the roof sat on the ground, the builders placed branches, reed, sunflower stems, Indian hemp stalks, corn stalks or broomcorn horizontally on the rafters. This was usually covered with a 35-40 cm layer of straw then topped with earth in the same thickness. Interestingly earthen roofs were covered this way all over the country, with only a few exceptions. The inside of the earth lodge, vertical walls and sloping roof surfaces alike, was plastered and whitewashed. The entrance mostly opened from one side (from the direction of the eaves) with its sunken part protected by a small roofed entryway from the adversities of weather (*Fig. 15*). There were two kinds of entryway. A narrow one with rectangular opening and a triangular with a square pitched roof like the house itself. The narrow entryway was in most cases supported by two small Y-shaped props in front, and topped with straw and earth. Its sides were either of wattle or of vertical sunflower stems and were sometimes even plastered. Less often, the entrance of the earth lodge was at the end. In such cases only the eaves protected the door, although in some cases there was a separate roof above the entrance leading downwards into houses of deeper position. The undivided earthen stables were similar structures save that most of them had no gable wall with windows. Their walls did not rise above ground level and were trimmed inside less carefully than human dwellings. Earthen stables were deeply sunk into the ground, so the incline leading inside was protected by a long and prominent entryway (*Fig. 15*).

In the foregoing we have also outlined some questions of construction technique. The building of a deep-sunk earth lodge began by digging then lining the pit, followed by standing the Y-shaped uprights, putting the ridge pole into their fork, and making the roof. But in what order did they perform the steps of construction when the pit was shallow and the trussing did not lean on its edges? Regrettably we have no concrete data either of the ethnographical or of the archaeological period, so in the first round we can only draw on common sense. And it tells us that the builders began by digging the uprights in, then put the purlin and the rafters on them and only dug the pit when the roof was ready. In this case the pit presents no difficulty in the course of construction, beams have to be lifted to smaller heights, and the edges of the pit do not crumble under the weight of the men hoisting the heavy burdens. As the pit is independent of the trussing, digging it subsequently poses no technical problem. We have to examine however whether we have any evidence, over and above reason, in support of this theory. The first and most important question is the depth of the posthole in which the uprights stand. For a long time we did not understand how people could erect a house under the circumstances, emerging fairly

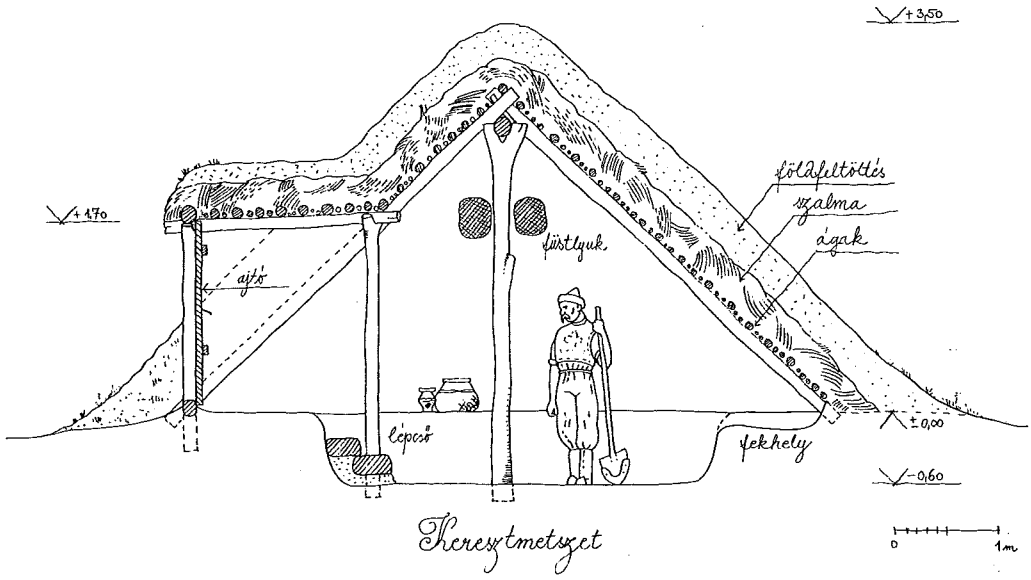


Fig. 13.
Cross section of the reconstructed pit house No. 363.

uniformly from archaeological excavations, i.e. with most Y-shaped uprights standing in 10-15 cm deep holes. This depth would not have been enough to hold even the dead weight of the 2-3 m high post itself, to say nothing of how they could have placed the ridge pole of similar length on such unstable props. Now this riddle is solved by the subsequent digging of the pit. Originally the uprights were dug in, say to 70 cm, then their vertical position stabilised by filling the hole again and tamping the earth hard. After constructing the roof the builders could dig the pit of 60 cm so the end of each upright was 10 cm deep in the ground. By then, however, the roof was fixed by its rafters and could not shift. Probably the earth, dug out of the pit, was thrown on the roof right away. So by the time it was taken from around the posts the structure was loaded and immovable. *Ad absurdum* even that can be imagined that in some of the pit houses, where no trace of posts could be found, the pit was dug up to the bottom of the postholes. Statically the loaded structure was just as stable as if the uprights were 10 cm deep in the ground. Reverting to the question of pits dug subsequently, we can pick out one more indirect proof from the archaeological finds. We fairly often come across pit homes where the posts are exactly in the edge of the pit. If the pit is dug out in advance, it is impossible to position the uprights right in the side and ram the earth back behind one half of it. If, however, we dig the pit after ramming, it will be possible to cut away the earth with a spade around half of each prop. Our

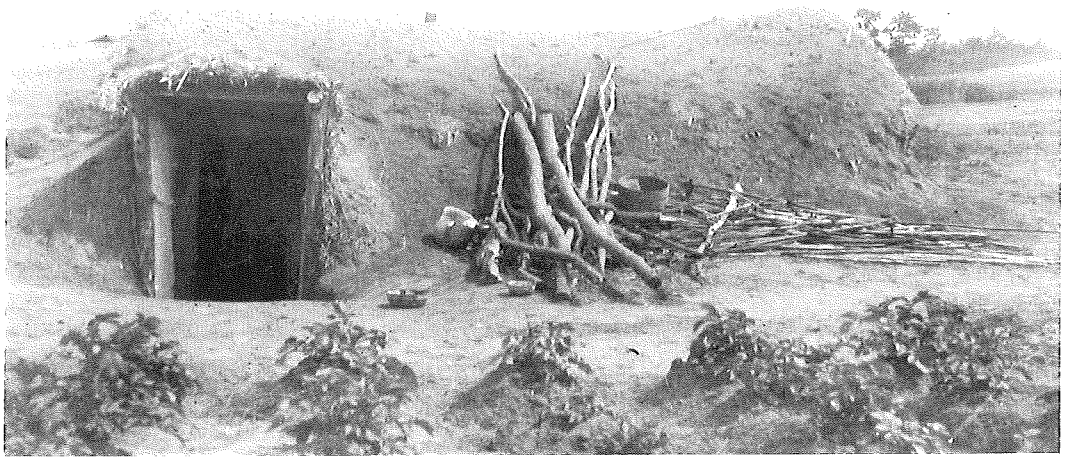


Fig. 14.
Earth lodge with small roofed entryway in Nyíradóny (Photo by Tagán Galimdsán 1933).

Fig. 15.
Semi-subterranean stable with small roofed entryway in Balkány (Photo by Tagán Galimdsán, 1933).

theory is also borne out by some remodelled buildings. Namely, according to our logic, the original holes for the uprights will be shallow, whereas the ones dug for the posts required by remodelling will be deeper, as these are sunk into the bottom of the old pit. And we have, indeed, found such an example in the literature. On the track of motorway M0, in Törökbálint-Kukoricadűlő, a pit house of 3 uprights, erected on a longitudinal ground plan, was found, one of whose ends had been renewed and the post by the oven transferred. The original props stood 10-12 cm deep whereas the transferred one at 50 cm (*Nyékhelyi 1992*, 175-76). Similarly eloquent are the postholes in the abode No. 5 excavated by the motorway in the territory of Szigetszentmiklós Üdülősor. Here the new uprights were put into the places of the old ones, but to a much greater depth (*Irásné Melis 1992*, 43; 63-5). Digging the pit subsequently is, of course, not the only choice. The independence of the trussing also lends possibility to the not too practical procedure to dig the pit in advance of erecting the house. The subsequent digging of the hole or pit, however, casts a new light on some subjects. E.g. we have supposed up to now that the measurements of the pit unambiguously indicate the size of the dwelling. On basis of the afore-mentioned, however, we cannot be sure of it all the time, as a trussing supported on posts standing outside the pit allows of more than one size for the pit subject to whether the builders prefer a large floor and small ledges of vice versa. That the floor sometimes overreaches the uprights (postholes are within the pit), in other cases extends up to them (postholes in the side of the pit), and on yet other occasions does not even reach them (postholes outside the pit) are signs pointing to this direction.

Reconstruction of the pit house No. 363, Sikátor

After as much deliberation we set about making plans for the reconstruction of a largish pit house, the object No. 363 excavated in the track of the motorway M0. Our job was comparatively easy as the details of the structure that had come to light were fairly typical. The 3 postholes in the axis of the pit we interpreted as Y-shaped uprights that supported the ridge pole, and the 2 smaller ones at the side as the props of the small roofed entryway (*Fig. 12*). In the corner of the pit there were the remains of an oven, which had originally had a round ground plan and plastered vault. Contemplating the fact that the purlin of the house was borne by 3 posts we concluded that it was not necessitated by the shortness of available trees but because of the considerable weight of the roof. Accordingly, following ethnographical examples, we decided for an earthen cover, whose order of layers we have been familiar with. The roof pitch we decided in 45 degrees and, as it turned out later, the earthen cover would not have allowed any larger angle of inclination. Based on archaeological data we planned the depth of the floor at 60 cm, so the Y-shaped uprights were to be stood at a depth of 72 cm. Along both sides of the pit, in parallel with the square roof, we reconstructed a ledge of 1 m width. At the ends, we thought, the ridge pole could have overhung the last uprights, forming a cantilever, even by as much as 1 m. Thus the ledges here became more narrow (*Fig. 12*). The length of the excavated pit was 4 m and its width about 3.7 (c. 15 square m). The roof we planned to be nearly 5 m long with a span of 6 m (c. 30 sq m) and the inner height of the abode, measured from the bottom of the pit, beca-

Fig. 16. *Setting up the structure of the pit house (Photo by T. Sabján 1997).*

Fig. 17. *Covering the roof with earth.*

me 3.6 m (*Fig. 13*). We placed one, 5.5 m long ridge purlin on the Y-shaped uprights, the ends of which, as already mentioned, overhung the posts at both front and back. The rafters we positioned at à m intervals, so that their drilled upper end were hung on the purlin by 30 cm long pegs of 4 cm diameter. When forming the roofed entryway which protected the entrance, we started from the two postholes at the side of the pit. We put a pair of small props into them and planned to place another pair opposite to them at a small distance. (No trace of these outer posts, just as well as no other possible trace of anything outside the pit, was recovered in the course of excavation.) On the props we placed a small, approximately horizontal purlin on each side. The roof we planned along ethnographical analogies: We laid branches close to each other on the rafters, covered them 30-35 cm thickly with straw, followed by a similar layer of earth. We imagined the end-walls made of wattle plastered on both sides. Similar walls were planned for the triangular sides of the entryway. The door, we pictured of rendered planks, held together by horizontal bars. The entrance was not leading down and no trace of stairs was found during excavation, so we thought, we would place a step made of 2 wooden beams into the pit between the inside props. A step like this facilitates going in and out and, in a few centuries after the abandonment of the abode, disappears without a trace. The diameter of the oven in the corner was 1 m, its bottom set on ground level. Its mouth opened, (diagonally), towards the centre of the room. Its ruined body we planned to resurrect in a hemispherical shape, made of clay mixed with chaff on a wattle frame. For smoke abatement we left 2 small holes in each gable wall. We determined their proper size so that they could be stuffed up with a bunch of straw or a piece of rag kept for the purpose. These 4 holes also provided the home with light. We made no attempt at reconstructing the furniture, we only arranged the interior so that resting places were on the wider ledges under the eaves and storage functions allocated to the narrow ones at the ends.

By reconstructing the dwelling our main aim was to demonstrate that the pit house, common in the Arpadian age, could be erected, used and inhabited in the form conjectured by us. In the course of realising our project we did not aim at applying medieval techniques. We could not possibly find craftsmen experienced in the use of contemporary tools and, at the first try, neither the capabilities of the tools, nor the times required for the various operations would have come to light and yielded authentic data respectively. We took care, therefore, in the course of planning, to only use structures and devices which, according to our present knowledge, are in harmony with the tools and technical level of the Middle Ages. Authenticity of material was another important consideration, so we envisaged wooden structures of oak but, in the course of construction, under the pressure of circumstances we had finally to content ourselves with easily and freely acquirable acacia wood.

For the construction of the pit house, the Biohistóriai Telep (Farm and Park for Biohistory) in Szarvasgede, situated in the estate that belonged to the Ligárd-Pethő mansion dating from the 18th century, offered ideal conditions. To prepare and direct the operation we assembled a team of 4 consisting of Zoltán Bencze and Miklós Takács archaeologists, Tibor Sabján architect-ethnographer, and Ferenc Gyulai, archaeo-botanist. We had the wooden construction material transported, stripped and cut to size, to Szarvasgede. As we had decided to dig the pit subsequently, we dug in first the

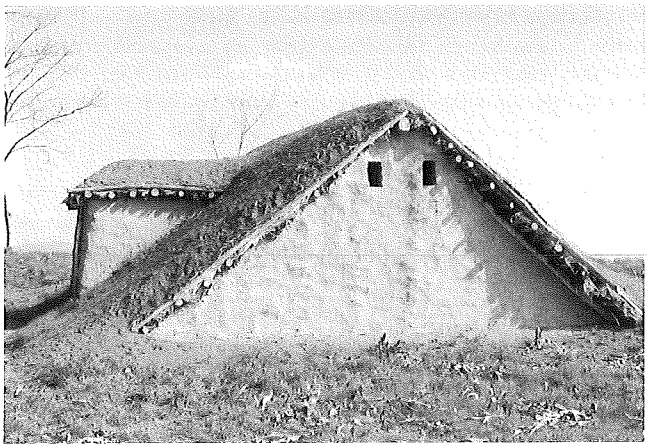


Fig. 18. *The pit house under its finished roof.*

Y-shaped uprights then stabilised them by ramming the earth back around them (*Fig. 16*). The straw we used remained after the reaping of *alakor* (a low-yielding strain of wheat, requiring little care, *Triticum monococcum*) produced on the farm, suited perfectly for covering the roof. The operation of spreading the straw was performed jointly with adding the earth taking great care to shovel it on in small quantities and on both sides less the structure should collapse under the uneven load. When the roof was covered the wattle walls, daubed with a mixture of mud and chaff, were prepared that closed the house on both ends (*Fig. 17*). In the planning stage we intended to leave the inside of the roof without daub. In the course of construction, however, it turned out that a fine dust from the earth cover would fall, at every knock or vibration, through even the compressed layer of straw right into the neck of those staying inside, so we decided for full inside plastering. The building process brought no major surprise or discovery. It has been proved that the dwelling we envisioned and planned can be set up simply and easily, the job requires no special tools or procedures. No skilled construction workers, in the modern sense (mason, carpenter, etc.) took part in the erection of the house. The job that required the highest expertise was the preparation of the door.

We began to build the pit house in October, 1988. At the outset a team of 4 carried out the various tasks. The structure, without the entryway, was set up in about 1 day, with entryway and fully covered roof the work lasted 4 $^{1}/_{2}$ days. Wattle-making and daubing, the construction of the oven and the digging of the pit were then done by 2 men, who, in the same period also performed other duties in the garden. It took them 3 weeks so, converting our data, we can say that the pit house in Szarvasgede was erected by 4 men in about 3 weeks. Now, thinking in terms of the age of the Arpads, we may assume that several men joining forces could raise the same abode in not more than 2 weeks. Of the work of reconstruction and the theoretical and practical experiences gained we wrote a detailed account which was published in a self-contained volume (*Bencze - Gyulai - Sabján -Takács 1999*).

Summary

The pit house plan put into practice at Szarvasgede represents one structural interpretation of a given find, therefore we may rightfully pose the question of what other ways of reconstruction exist. A possibility, well worth considering, of connecting pit and ground level is the formation of steps as visible in the sketch by Ottó Herman of the fishermen's hut in Nádudvar, and which was also characteristic of the navvies' shelters. With this method the ledges at the sides of the pit, were also sunk (*Fig. 3*). The purlin roof resting on Y-shaped uprights seems to be the element of pit homes we may be most sure of. In the majority of archaeological finds this is the trussing that can be concluded from the traces. Rafters could be attached to the ridge pole in various ways. Beside joining them to the purlin with pegs, as we did, a rafter clench by knags of natural growth is also imaginable, or the use the rafters in pairs by slipping one into a slit of the other and clenching them with a peg. It, too, is possible to simply prop the roof trees against each other. Hook-on rafters were, subject to the weight of the cover, set more or less close to each other. In certain structures it is not out of the question that they were laid side by side. Huts erected on a round ground plan probably had a central post or a conical structure where poles were propped together at the peak. As to roofing, ethnographical examples point towards the predominance of earth, but roofs could also be covered by reed, weeds of all kinds, sedge, straw, trodden or tied, or by sods. With houses e.g. where the Y-shaped uprights stood at a distance of 4 to 5 m from each other, without any other prop in between, the idea of lighter roofing comes readily to the mind. The structure of gable walls, too, is an open question, as we have got no clue from excavations. Wattle wall is just one of the possibilities. Daubed reed or daubed vertical stakes are just as imaginable. It is not impossible either that the lower end of these wall was not dug in but stood on ground sills. The small, roofed entryways could be quite common, but triangular entrances, with a roof pane on both sides, as known from ethnographical examples, could also have occurred. For houses, entered at the end, a sunken, downward leading entryway must have been made in most cases, under separate roof.

The gist of theoretical conclusions drawn from the reconstruction of this pit-house dating from the Arpadian age is that, as against the earlier formula of *house=pit*, we may interpret the pit as a sunk central area for work and moving about with resting- and storage places on the ledges around. Excavation methods applied up to now are unsuited for revealing abodes of this kind as the stripped level, where the shape of the pit appears, is below the medieval surface. On a site of favourable circumstances it might be possible to expose the contemporary surface and establish how the pit house, found through the exploration ditch, related to its surroundings, i.e. what traces of building can be found outside the pit.

Still on the theoretical level, we have to examine for what types of finds may the construction method proposed be valid. From the sunken abodes our

theory may only apply to those with a shallow pit as in the case of houses dug 1.5-2 m deep the ledge coming about on the edge of the pit and the room of deep floor could not be living spaces of equal value. The place and form of the entrance, the number of posts and the existence of a liner in a hut over a shallow pit, do not, on the other hand, exclude, sometimes even confirm our ideas. E.g. a door of practicable size can only be imagined on an entrance at the end of a pit house if the roof does not start from the edge of the pit. The liners of the hole and their traces respectively, we do not take for the remains of a wall but for a reinforcement to protect a ledge (or to repair a broken one). Houses with a shallow pit were widespread not only in the Carpathian Basin but also on sizeable territories of Central and Eastern Europe (*Bóna 1988*, 409-10; *Fodor 1989*, 35; *Hoffmann 1995*, 206). We think, they, too, could have been based on similar principles as the one we erected in Szarvasgede. The applicability of our theory is not limited in time either to the Arpadian period but may be true for much earlier pit houses, too. Pit dwellings of the like were probably erected as early as the age of the Avars.

In any case, the new conception of pit houses casts an entirely new light on quite a few professional questions. We wish to mention here only some of them without claiming completeness. If the pit home with inside ledges was the most commonly constructed type of abode for 300-400 years, it is practically impossible that it has completely disappeared from our material world. According to our recent ideas this did not happen, but around the end of the Arpadian age pit dwellings dropped out of the mainstream of domestic architecture and preserved as temporary shelters outside the settlements their method of construction. In conclusion we also have to revise our picture of the life and home of medieval man. The huts they inhabited were not so "miserable" by far as research workers almost unanimously presumed. Why should people have adhered to their 9-10 sq m houses for centuries when much more comfortable dwellings (yurt, above-ground buildings) existed in front of their eyes? Of course, we do not want to make the pit house of 25-30 sq m reconstructed by us appear as an ideal home of high comfort level but compared to other types of abode, the difference is not the striking one any more that could be imagined until now, and which rendered unexplainable the adherence of the people of an age (or even ages) to their semi-subterranean dwellings.

Zusammenfassung

Am Anfang seiner Studie durchblickt der Verfasser die allgemeine Problematik der Grubenhäuser der Árpádenzeit, und analysiert sie aus der Hinsicht der Ausmaßen und der Gestaltungsstruktur. Früher dachten die Archäologen und die Experten der Völkerkunde, daß die Oberfläche der ehemaligen Gebäuden identisch sei. Der Verfasser beweist uns, daß in einem solchen Hausdessen Länge und Breite 3 x 3 Meter beträgt, könnten die Bewohner laut der Analyse, gar nicht entsprechend wohnen, arbeiten und verkehren. Der Fußboden konnte sogar einer kleinen Familie keinen Rast- und Schlafplatz anbieten (*Abb. 1*). Die Strukturelle Ausbildung erweckt auch Schwierigkeiten, denn am Rande der Grube konnte man die Dachbaustruktur nicht anlehnen und ganz und gar nicht befestigen, die Öfen die aus der Grube herausragten, wären unter dem Gewicht des Daches eingestürzt, und ein Ofen in der Ecke hätte die Dachbalken des Hauses leicht anzünden können.

Aus den völkerkundlichen Forschungen ist uns aber eine zeitweilige Siedlungsart bekannt, dessen Boden in der Mitte vertieft war, und die so entstandenen Bänkchen an den beiden Seiten konnten als Schlaf- und Lagerplatze dienen. Solche Hütten wurden von den Fischern, Hirten, Holzfällern und Melonenhütern, die weit von ihrem Wohnort arbeiteten gebaut (*Abb. 3-11*).

Der Verfasser nimmt an, daß die Grubenhäuser auch Gebäude seien, die auf diesem Prinzip gebaut wurden, aber aus den Ausgrabungsresultaten kennen wir nur die einstigen Eintiefungen, die unter das Erdniveau gegraben worden waren.

Laut der folkloristischen Beispielen zeigt die Abmessungsuntersuchung der Grubenhauser keine Schwierigkeiten, es ist einfach ins Haus hineinzukommen, soll es von der Seite, oder von der Giebelmauer geschehen. Man kann im Haus leicht auf und abgehen, dem Bänkchen und dem Ofen kann man sich auch aufragend stehen nähern. Die Ausbildung der Struktur verursacht keine statischen Schwierigkeiten. Die Dachsperren lehnten sich in einer ziemlich beträchtigen Entfemung an dem Boden, die Öfen könnten nicht unter dem Gewicht des Daches einstürzen, die Flammen, die emporragen konnten die Sicherheit des Daches, beziehungsweise des Holzmaterials nicht gefahrden (*Abb. 2*). Eine solche Interpretierung der Grubenhäuser würde alle bisherigen Fragen und Probleme lösen, und würde die Möglichkeit des Rekonstruktion der Grubenhäuser neu erwecken.

Der Verfasser analysiert und betrachtet auch die Frage der, in die Erde eingetieften Wohnhäuser und Stallgebäuden der nahen Vergangenheit, obwohl ihre Grundrisse und Feuererrichtungsstellen nicht, die árpádenzeitlichen Prinzipien verkörperten, sondem die der später gebauten Häuser. Ihre strukturellen Lösungen können aber als Analogien betrachtet werden (*Abb. 12-13*).

Diese Gebaude wurden in eine betrachtliche Tiefe von 150-200 cm eingegraben, die innere Seite der Grube war mit einer Futtermauer umgeben.

In seiner technologischen Analyse stellt der Verfasser fest, daß die aus der Völkerkunde bekannten, in die Erde eingetieften Häuser so entstanden, daß man zuerst die Grube ausgrub und nachher das Haus aufbaute. Im Gegensatz damit ist die Dachkonstruktion der árpádenzeitlichen Grubenhäuser mehr oder weniger unabhängig von der Grube, deshalb wurde bei ihrem Bau zuerst das sich auf dem Boden lehnendes Dach gebaut, und die Grube wurde erst nach der Beendung dieser Arbeit ausgegraben. Das beweisen die 10-12 cm tiefen Strebenlöcher. In eine so geringe Tiefe eingegrabene Streben hätten kaum ihr eigenes Gewicht halten können! Tatsächlich wurden sie 70-80 cm tief eingegraben, und nachdem das Dachwerk schon stabil stand, wurde die 60- 70 cm tiefe Grube ausgegraben.

Unsere Arbeitsgruppe wählte von den Ausgrabungen der Trasse der Autobahn MO das Grubenhaus 363, mit der Absicht, es zu rekonstruieren. In der Achse der relativ großen Grube befanden sich drei Löcher in einer Linie, wir können sie als Spuren von Streben interpretieren. In der Seitenwand der Grube fanden wir zwei weitere, kleinere Löcher, wahrscheinlich Spuren der Streben die das Schutzdach des Eingangs halten konnten.

In der Ecke des Grubenhauses legten die Archaologen eingestürzte Überbleibsel eines Ofens frei (*Abb. 14*).

Die Pläne wurden laut der Begebenheiten vorbereitet. Die Sperren lehnten sich an die Seiten, mit je einem Meter vom Rande der Grube, auf den Boden. Die Pfette wurde an beiden Seiten der Streben konsolenweise weitergestreckt. Wir haben das Dach mit einer Neigung von 45 o geplant, auf die 50 cm voneinander liegenden Sperren legten wir eine dichte Zweigbedeckung, darüber wurde Stroh gestreut (etwa 30-35 cm dick), und am Ende wurde alles mit einer gleich so dicken Erdschicht zugedeckt. Das Schutzdach des Eingangs wurde von je zwei Streben hochgehalten, der obere Teil wurde in der gleichen Weise bedeckt wie die anderen Teile des Hauses (Abb. 14-15).

Das Haus wurde auf dem Gelände der Biohistorischen Anlage von Szarvasgede (Komitat Nógrád) gebaut. Unser erster Ziel war die Baumöglichkeit und die Bewohnbarkeit des Hauses zu beweisen, deshalb strebten wir auf keine technologische Treuheit, wir verwendeten moderne Mittel. In der gegebenen Zeit bauten vier Männer das Haus in drei Wochen auf. Es ist wahrscheinlich, daß man diese Aufgabe in der Árpádenzeit von mehreren Leuten, routinenvoller, in kürzerer Zeit vollendet wurde (*Abb. 16-18*).

Die von uns interpretierten Grubenhäuser entsprechen nicht den früher vorgestellten, 9-10 Quadratmeter großen armlichen Nothütten, sondern Hausern mit einer Oberfläche von 25-30 m².

Die von den Archäologen freigelegte Grube war also nur der eingetiefte Verkehrs- und Arbeitsraum des Hauses, die Bänke, die als Schlaf- und Lagerplätze dienten befanden sich rundherum. Dieses Bauprinzip wurde von den, aus den völkerkundlichen Forschungen gut bekannten zeitweiligen Wohnstätten im Laufe der Jahrhunderte aufbewahrt.

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