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Dating loom weights from Százhalombatta-Földvár, Hungary

Abstract

Loom weights are difficult to date as they are fairly consistent in weight and shape over long periods. This article discusses the dating of 194 light loom weights with no contextual data from Százhalombatta, Hungary. The aim of this paper is to present previously unpublished material and identify the period to which the textile tools belong. It shows that the light loom weights in this study most likely belong to the Hallstatt period based on the find site's characteristics and comparison with loom weights from dated contexts.

Keywords textile production, Bronze Age, Hallstatt period, weaving, hillfort, tell, Százhalombatta-Sánc-hegy

Introduction

A number of loom weights have been found at the archaeological site Százhalombatta-Földvár in Hungary. Some of the textile tools at the site came to light from excavations of reliably dated contextual layers (Poroszlai 2000; Bergerbrant forthcoming; Vicze & Stig Sørensen in print) but a large number were collected by members of the public who regularly visited the site (Poroszlai 2000, 15). This article discusses the loom weights which were given to the Matrica Museum, Százhalombatta by private collectors, who found the loom weights while working on their own property.

The area has the remains of a large fortified Iron Age settlement and an Early and Middle Bronze Age tell (Poroszlai 2000; Vicze 2005, 66). The settlements are strategically placed on the Danube overlooking a bend in the river (fig. 1). The settlements of both periods are situated largely next to each other on the same natural promontory above the Danube. In order to distinguish between them the Bronze Age tell is referred to as Százhalombatta-Földvár and the Iron Age hillfort as Százhalombatta-Sánc-hegy.

Today, the Bronze Age tell site covers an area about 200 m long and 100 m wide (Poroszlai 1992, 153; 2000, 14)

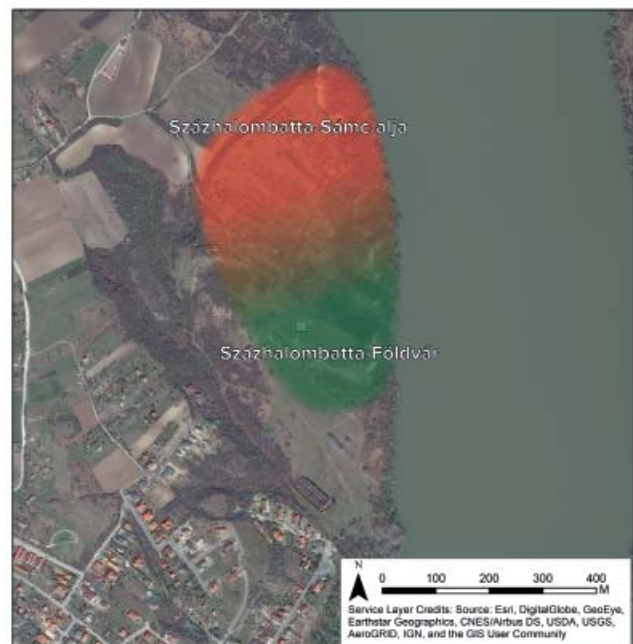


Fig. 1: The locations of Százhalombatta-Földvár and Százhalombatta-Sánc-hegy and other Hungarian sites with discoid loom weights (Image: Sophie Bergerbrant)



ID	weight/g	complete	remains	estimated weight g	height/cm	width/cm	marks
87.2.1	67	yes	all	67	6.1	3	
87.2.2	56	yes	all	56	5.6	3	
87.2.3	57	yes	all	57	6.1	2.9	
87.2.4	47	almost	almost	50	5.5	2.8	
87.2.5	56	yes	all	56	5.5	2.8	
87.2.6	57	yes	all	57	6	3.3	
87.2.7	54	yes	all	54	6.4	3	
87.2.8	53	yes	all	53	5.5	3.4	
87.2.9	48	yes	all	48	5.4	2.9	
87.2.10	51	yes	all	51	6	3.1	
87.64.1	132	yes	all	132	7.2	4.2	cross
87.64.2	104	yes	all	104	6.6	4.3	
87.64.3	93	yes	all	93	6.9	4	
87.64.4	122	yes	all	122	6.9	4.6	cross
87.64.5	82	yes	all	82	6.7	3.5	
91.1.1	65	yes	all	65	5.6	3.1	
91.1.2	103	yes	all	103	6.4	3.4	
91.1.3	134	yes	all	134	6.4	4	cross
91.1.4	106	yes	all	106	6.3	4	
91.1.5	76	almost	almost	80	5.8	3.3	
91.1.6	89	yes	all	89	6.4	3.1	
91.1.7	69	yes	all	69	5.6	3.2	
91.1.8	56	yes	all	56	5.8	2.8	
91.1.9	104	not			6.2	3.5	X
91.1.10	90	yes	all	90	6.7	2.7	
91.1.11	107	yes	all	107	5.9	3.4	cross
91.1.12	127	yes	all	127	7	3.4	
91.1.13	49	yes	all	49	5.4	2.4	
91.1.14	77	almost	almost	85	6.4	3.3	
91.1.15	125	almost	almost	130	7.6	3.6	
91.1.16	126	yes	all	126	7.2	3.6	
91.1.17	79	yes	all	76	6.2	3.1	
91.1.18	75	yes	all	75	5.7	4.4	cross
91.1.19	58	no	half		6.3	3.4	
91.1.20	63	yes	all	63	5.5	3	
91.1.21	55	yes	all	55	5.5	2.8	
91.1.22	70	yes	all	70	5.8	3.2	
91.1.23	56	almost		65	6.4	2.7	
91.1.24	97	yes	all	97	6.9	3.4	
91.1.25	109	no			7	3.8	I
91.1.26	103	yes	all	103	5.8	2.8	

Table 1a: Pyramidal loom weights. Estimates are indicated in normal text and complete weights in bold. The lengths and the widths are measured at their broadest parts



91.1.27	55	no			6.4	2.8	
91.1.28	72	yes	all	72	6.2	3.1	
91.1.29	125	no			8 cm	4	
91.1.30	50	no			5.5	3.1	
91.1.31	106	almost		110	5.9	4	
91.1.32	62	no			7	2.8	
91.1.33	60	no			6	2,8	
91.1.34	74	almost	almost	80	5.8	2.8	
91.1.35	85	almost	almost	90	5.8	3.1	
91.1.36	103	almost		120	7.1	4	cross
91.1.37	51	no			5.4	2.8	
91.1.38	53	no			6.9	3	
91.1.39	98	no		120	6.7	3.7	
91.1.40	112	almost		115	7.2	4.1	
91.1.41	104	almost	almost	110	6.5	3.4	
91.1.42	59	no	top missing		4.1	3	
91.1.43	100	almost		110	6.6	3.8	
91.1.44	61	almost			6	3	
91.1.45	80	no	almost	90	6.8	3.6	cross
91.1.46	103	no			6.4	4	
91.1.47	103	almost		110	7.1	3.6	
91.1.48	92	no			6.7	3.1	
91.1.49	60	no	only upper		5.6	3.1	
91.1.50	60	no		75	5.6	2.8	cross
91.1.51	44	no			6	3.3	
91.1.52	40	no			5	3.5	I
91.1.53	53	no	little		5.4	3.2	
91.1.54	44	no			5.1	2,8	
91.1.55	113	no			6.9	4	cross
91.1.57	39	no	half		4.5	3	
91.1.58	65	almost		70	5.2	3.6	
91.1.59	63	yes	all	63	5.9	2.9	
91.1.60	67	yes	all	67	5.9	2.8	
91.1.61	135	yes	all	135	7	4	cross
92.1.1	112	yes	all	112	6.6	4.6	
92.1.2	65	almost	almost	67	5.1	2.8	
92.1.3	53	no			5.1	3.2	cross
92.1.4	72	no			6.4	3.6	
92.1.5	72	almost	almost	75	6.1	3.5	
92.1.6	132	no			7.1	4.2	
92.1.7	135	yes	all	135	6,3	4,4	cross
92.1.8	134	yes	all	134	6.8	4.4	X
92.1.9	76	yes	all	76	6	3.2	

Table 1b: Pyramidal loom weights. Estimates are indicated in normal text and complete weights in bold. The lengths and the widths are measured at their broadest parts



92.1.10	108	no			6,3	4,1	X
92.1.11	86	almost	almost	90	5.2	4.1	
92.1.12	109	no			6.2	3.8	cross
92.1.13	108	almost	almost	111	7.3	3.8	
92.1.14	104	no			6.3	3.5	X
92.1.15	108	almost	almost	110	6.3	3.8	X
92.1.16	94	no			6.1	4.2	
92.1.17	83	no			6.3	4.6	
92.1.18	41	no			5.2	2.6	cross
92.1.19	54	no			6.1	3.1	
92.1.20	121	yes	all	121	6.7	4.2	cross
92.1.21	98	no		110	6	3.6	
92.1.22	101	no			6.3	4	
92.1.23	125	yes	all	125	7.6	4.4	X
92.1.24	90	no			6.2	4.1	cup
92.1.25	124	yes	all	124	6.8	4	X
92.1.26	130	yes	all	130	7	4.5	cross
92.1.27	100	yes	all	100	6.3	4	
92.1.28	125	yes	all	125	6.6	3.9	cross
92.1.29	122	no	all	122	6.2	4	cup
92.1.30	130	yes	all	130	6.8	4.2	cross
92.1.31	131	yes	all	131	7.2	3.6	cross
92.1.32	92	yes	all	92	6.4	3,3	
92.1.33	120	no			7	3.7	
92.1.34	118	almost	almost	125	6.8	3.3	X
92.1.35	75	almost	almost	78	7	3.2	
92.1.36	107	yes	all	107	6,1	3,6	cross
92.1.37	93	yes	all	93	5.8	4	cross
92.1.38	71	yes	all	71	6	3	
92.1.39	130	yes	all	130	7	4,5	cross
92.1.40	81	yes	all	81	6.6	3.1	
92.1.41	78	no	all	78	6	3.1	
92.1.42	79	yes	all	79	5.5	3.5	
92.1.43	64	yes	all	64	5.2	3.2	
92.1.44	67	yes	all	67	5	3.6	
92.1.45	123	yes	all	123	7	3.8	X
92.1.46	79	yes	all	79	6	3	
92.1.47	75	yes	all	72	5.6	3.4	
92.1.48	64	almost		67	5.4	3.3	
92.1.49	107	almost		115	6.8	3.4	
92.1.50	76	almost		79	6.2	3.6	
92.1.51	69	almost		71	5.9	3.6	
92.1.52	48	no			5.6	2.3	

Table 1c: Pyramidal loom weights. Estimates are indicated in normal text and complete weights in bold. The lengths and the widths are measured at their broadest parts



ID	type	weight/g	complete	remains	estimated weight g	hight/cm	width/cm	thickness
87.1.1	C	80	no			6.3	5.3	1.3
87.1.2	C	60	no			6.6	5	1.7
87.1.3	C	51	no					
87.1.4	C	81	no			5.6	5,8	1.8
87.1.5	C		no					
87.1.7	C	76	no			5	6.2	1.7
87.1.6	D	100	almost	almost	110	5.9	6.2	1.6
87.1.8	D	93	yes	all	93	5.2	5.5	1.8
87.1.9	C	109	yes	all	109	7.2	6.3	1.4
87.1.10	C	62	no	less 1/2		6.9	4.3	1.8
87.1.11	C	55	no			6.9	4.1	1.5
87.1.12	D	97	almost	almost	100	6.3	6.3	2.2
87.1.13	C	86	no			5.9	6.6	1.3
87.1.14	C	106	almost	almost	110	6.8	6.5	1.6
87.1.15	C	95	yes	all	95	6.8	6.3	1.8
87.1.16	D	60	no			4.7	4.3	2.2
87.1.17	C	85	no			5.7	7.6	1
87.1.18	C	102	yes	all	102	7.3	6.8	1.3
87.1.19	C	123	yes	all	123	7.2	7.4	1.5
87.1.20	C	85	no			6.2	5.6	1.8
87.1.21	D	68	no			5.3	5.7	1.7
87.1.22	C	60	no	1/2		6.9	7.2	1.1
87.1.23	C	37	no					
87.1.24	C	96	no			7.6	7.4	1
87.1.25	C	30	no					
87.1.26	C	112	yes	all	123	7.8	7.2	1.1
87.1.27	B	83	no			4.9	6.1	1.9
87.1.28	C	81	no			5.6	7	0.9
87.1.29	C	64	no			5.3	5.7	1.6
87.1.30	C	97	yes	all	97	6.8	6.3	1.3
87.1.31	C	73	no			5	6.6	1.9
87.1.32	D	95	yes	all	95	5.7	5.6	1.5
87.1.33	C	14	no					
87.1.34	A	74	yes	all	74	5	6.2	1
87.1.35	A	69	no			4.8	5.8	1.5
87.1.36	A	82	yes	all	82	5.2	6.2	1.5
87.1.37	transitional	64	no			4	5.7	1.7
87.1.38	A	87	yes	all	87	5.2	6.8	1.4
87.1.39	A	74	no			5.8	6.2	1.6
87.1.40	B	50	no	c. 1/2	100	6.4	2	1.2
87.1.41	A	74	no	2/3		6.2	6.8	0.9

Table 2a: Discoid loom weights. Estimates are indicated in normal text and complete weights in bold. The lengths and the widths are measured at their broadest parts.



87.1.42	C	58	no			4,8	6.7	1.2
87.1.43	A	87	yes	all	87	5.3	6.9	1
87.1.44	A	78	yes	all	78	6.4	6	1.2
87.1.45	A	94	no			5.6	6.2	1.3
87.1.46	A	71	almost	almost	72	6.3	5.8	1.3
87.1.47	A	68	no			6.6	5.7	1.2
87.1.48	A	64	no			6.1	5	1.7
87.1.49	A	68	no			6	5.2	2.2
87.1.50	A	92	yes	all	92	6.2	5.2	1.9
87.1.51	A	94	yes	all	94	7.2	6	0.9
87.1.52	A	82	no			5.6	6.1	1.6
87.1.54	B	61	no			4.7	6.3	1.2
87.1.56	B	94	yes	all	94	5.2	6.2	1.6
87.1.55	transitional	81	yes	all	81	4.7	5.6	1.7
87.1.57	round	51	yes	all	51	5.4	3.6	2.1
87.1.58	A	98	yes	all	98	5.3	6.7	2.4
87.1.59	A	89	yes	all	89	5.8	6.3	1.4
87.1.60	A	83	yes	all	83	6.8	6.9	1.2
87.1.61	A	90	yes	all	90	6.7	5.7	0.9
87.1.62	A	94	yes	all	94	6.1	5.3	1.3
87.1.63	A	91	almost	almost	100	5.8	6.7	1.6
87.1.64	A	21	no					
87.42.1	C	117	almost	almost	118	7.8	8	1.8
87.42.2	D	103	yes	all	103	5.5	6	1.7
87.42.3	C	113	yes	all	113	8.2	7.2	2
87.42.4	C	121	yes	all	121	8	7.1	2.2

Table 2b: Discoid loom weights. Estimates are indicated in normal text and complete weights in bold. The lengths and the widths are measured at their broadest parts.

and has 3 m to 5 m deep, well-preserved occupation levels, which date to the period from between 2300 and 1500/1400 BCE (Vicze 2013). The Middle Bronze Age tell settlement belongs to the Vátya culture (Poroszlai 2000, 13; Vicze 2013).

The Hallstatt period hillfort is triangular in shape with sides of unequal length (500 m, 600 m and 700 m) (MRT 7 1986, 231-233). The hillfort covers an area of about 10 hectares and is protected by an earth wall or rampart and a ditch, which today is 11.5 m high in places. It is regarded as having been an important centre throughout the Iron Age. The settlement was also occupied during the La Tène period. So far, the only example of Celtic stone sculpture in Hungary, a carved stone head, was found within the enclosed settlement (Poroszlai & Vicze 2004, 93; Jerem & Mester 2010, 54-56). The hillfort has the largest known Hallstatt period tumulus cemetery in Hungary

(Poroszlai 1999, 376), which covers about 50 hectares and consists of close to 400 burials (Czajlik et al. 2016) of which 122, the larger ones, were visible and began to be documented as early as 1847 (Czajlik 2008, 97; Luczenbacher 1847, 286).

The geological layer under the Bronze Age settlement contains clay that was historically seen as suitable for brick making and was used in a factory situated next to and 130 m below the site. The demand for the clay has meant that some of the archaeological remains were destroyed during its extraction (Poroszlai 2000, 14; Vicze 2005, 66-68). Excavation has shown that the top of the Bronze Age tell includes a mixed level containing finds from Hallstatt C-D and La Tène D as well as some from the Middle Bronze Age. From level II and below, the material is dated to the Middle and Early Bronze Age (Poroszlai 2000, 16).

It has been pointed out that loom weights are fairly

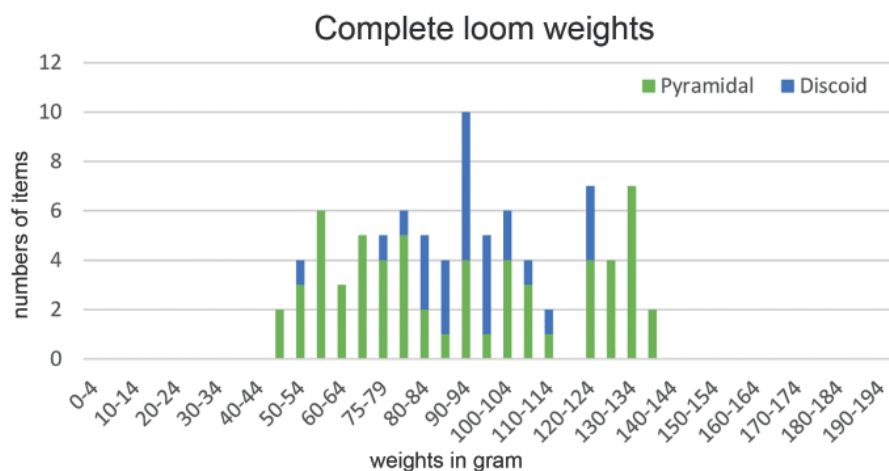
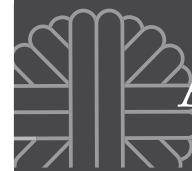


Fig. 2: The weights of the complete loom weights: green indicates pyramidal loom weights and blue indicates discoid loom weights (Image: Sophie Bergerbrant)

similar in weight and shape over long periods and are therefore difficult to date (Gleba 2008, 128). The tools discussed here have been registered in the Matrica Museum as belonging to the Middle Bronze Age and have been previously published as such (Poroszlai 1992; Poroszlai & Vicze 2004; Marton 2001, 300). This was based on their provenance and a brief preliminary study. The general area where the tools were found contains both Bronze Age and Iron Age remains. With no contextual data, the dating of these tools is unclear and they need to be analysed and compared with other textile tools. This article aims to present the previously unpublished work on them and an analysis of the period to which they might belong.

Method

All of the weights included in the study are held by the Matrica Museum and were examined in person. The weights were weighed to the nearest gram. In the case of fragmented loom weights, the full weight was estimated wherever possible. For those that were even less complete, only the current weight was recorded (table 1 and table 2). The loom weights' widths, heights and depths were recorded according to Mårtensson et al. (2009, fig. 7).

Material

In total, 194 loom weights were examined for this study. In each case, the loom weight has a single suspension hole. They were found outwith a closed archaeological context at the site Százhalombatta-Földvár by private collectors and given to the Matrica Museum, Százhalombatta between 1987 and 1992. Of these, a total of 127 (see fig. 2, fig. 3 and table 1)

Pyramidal



Fig. 3: A pyramidal loom weight (Image: Sophie Bergerbrant)

could be defined as small pyramidal loom weights. More than half are complete or almost complete, and their original weight could be calculated. The complete or almost complete weights range between 48 g and 135 g with a mean of 90.66 g (based on 61 complete loom weights). Most of the pyramidal loom weights (Mårtensson et al. 2009, fig. 2) are of Gleba's (2008, 131) type F2a, and the bases are more or less rectangular.

A total of 35 weights have decoration on the top. The cross symbol is the most common mark; it was found on 22 weights. Nine loom weights have an X mark, two have a small round depression and two have an I mark on their tops. A total of 24 of the marked examples are complete or almost complete and they weigh between 75 g and 135 g. No differences between the marks can be discerned concerning the weight or height of the loom weights with marks. However, as a group they are among the heavier examples in the complete collection. The pyramidal loom weights measure between 4.1 cm and 8 cm in height and from 2.7 cm to 4.6 cm in width (at the broadest part). The median width is 3.6 cm and the median height is 6.3 cm.

There are 67 discoid loom weights (Mårtensson et al. 2009, fig. 2; see fig. 4-8 and table 2 for all with an estimated weight) which measure between 51 g and 123 g, with a mean 94.15 g (based on 26 complete loom weights). A discoid loom weight is one which is flat or which has a slightly convex surface, and has the suspension hole near the edge (Gleba 2008, 132; Mårtensson et al. 2009). While these major characteristics enable the pieces to be grouped among the discoid loom weight category, there are three types

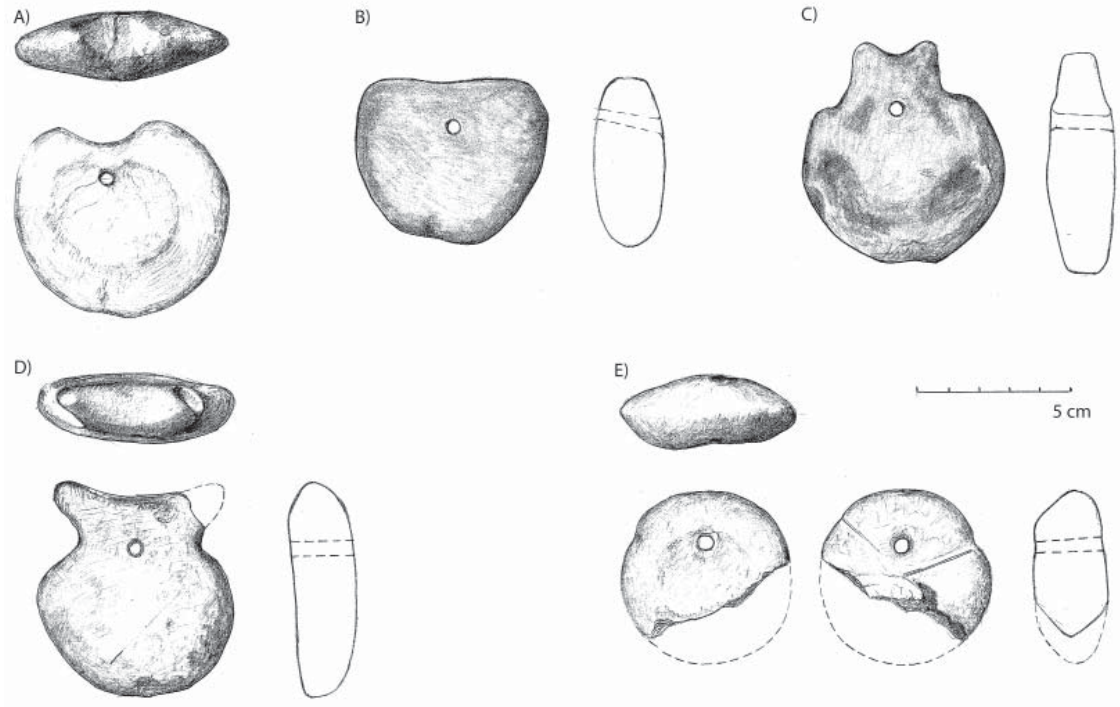


Fig. 4: The five discoid types of loom weights from Százhalombatta-Földvár, Hungary (Image: Sophie Bergerbrant)



Fig. 5: A round discoid weight (number 1); type A discoid loom weights (numbers 2 to 25) (Image: Sophie Bergerbrant)



Fig. 6: Type B discoid loom weights (Image: Sophie Bergerbrant)



Fig. 7: Type C discoid loom weights (Image: Sophie Bergerbrant)



Fig. 8: Type D discoid loom weights (Image: Sophie Bergerbrant)



that seem to be unique to this assemblage. They are all handmade and have a wide variety of individual characteristics.

The discoid loom weights can be broadly divided into five distinct types. All of them have a rounded lower part but vary in the upper part (fig. 4). The first type (A) has a depression on the top above the suspension hole (fig. 5.2-25) which can be like a small dimple that gradually widens and transforms from an almost half-circle (fig. 5.8-11, 15) to a long flat surface with two little ear-like protrusions (fig. 5.16-18, 20). It is interesting that in some cases the depression is asymmetrical, causing the ear-like protrusions to become lopsided (see fig. 5.4, 8-9, 14-15, 18, 22). Fig. 5.25 shows that this asymmetry could very well be intentional as the piece was deliberately made this way. Type B can be described as a half circle (fig. 6) with a round lower half and a straight or almost straight top part. No other example of this form has been found in Hungary so far. It is interesting to note that there are two examples that can be considered transitional pieces between groups A and B (fig. 5.19, 23). The third form has the same rounded lower part but instead of going down in the middle, the upper part goes up (C), forming, over a shoulder-like feature, a double knob, which is over the suspension hole (fig. 7). Interestingly, there are five pieces within this group, which do not have rounded lower halves but instead finish in a straight line (fig. 7.13-17). No parallels for this type have been located. A probable derivation from type C is the next type (D), where on top, above the shoulder, wide horn-like horizontal protrusions can be seen (fig. 8). The shape of these loom weights at this time is unique to the site. There is only one example of the classical (E), completely round discoid shape (fig. 4.E and 5.1). A total of 23 loom weights are of type A, while there are four of type B, 30 of type C, and seven of type D. It was not possible to categorise the single round discoid and two transitional forms. A total of 26 were complete, making it possible to determine the exact weight; these range between 51 g and 123 g. Though clear divisions between the types are difficult to discern, type A examples tend to be lighter (with an average weight of 87.3 g based on 12 pieces) while the heavier pieces (with an average weight of 110.4 g based on eight pieces) are of type C. The height of the complete examples varies from 5 cm to 7.4 cm. The width at the widest point (measured on all that had a complete middle section) ranges between 4.1 cm and 7 cm. The thickness of the discoid loom weights is between 0.9 cm and 2.2 cm with a mean of 1.15 cm and a median value of 1.5 cm (based on 61 measurements).

Dating the loom weights

The existence of warp-weighted looms is illustrated by the presence of loom weights (Gleba and Mannering 2012, 14-16). It can also be seen in the eastern Hallstatt area in the well-known depiction on a conical necked vessel in Tumulus 27 from Sopron-Burgstall (Várhely in Hungary), which shows one woman spinning and another weaving on a warp-weighted loom (Grömer 2012, 58).

The contexts, shapes, marks and weights of the loom weights were analysed to pinpoint a possible date for them. Several studies have been conducted on textile tools in the Bronze Age in the east Mediterranean (Andersson Strand & Nosch 2015; Burke 2010), and some on central and northern European examples (Belanová Štolcová & Grömer 2010; Kneisel & Schaefer-Di Maida 2019) and Italian (Gleba 2008; Sabatini 2019) of loom weights. These studies in addition to several others were the basis for the discussion which follows.

Site context

The excavations of the Middle Bronze Age tell settlement produced a small number of textile tools. They are found in a reliably dated context. The loom weights are all pyramidal in shape and weigh from 340 g to more than 1 kg (Bergerbrant, forthcoming). Excavations in the hillfort Százhalombatta-Sánc-hegy produced spindle whorls, a bobbin (?) and bone needles all dating to the latter half of the early Hallstatt period, Ha C2-D2, circa 800/750 BCE to 450 BCE (Marton 1999, 140). At least one of the spindle whorls is biconical (Marton 1999, table 2:1).

The archaeobotanical data from Százhalombatta-Földvár shows only a nominal presence of flax seeds (*Linum usitatissimum*) in the Middle Bronze Age and none in the Late Bronze Age (Stika & Heiss 2013). The seeds may have been removed before the plant was brought back to the settlement (Maier & Schlichtherle 2011, 568) and the very low quantity could indicate that flax was not processed on the site or was an unimportant crop during the period. This may suggest that flax was not a major component in fabric making. However, it must be borne in mind that an absence of evidence is not evidence of absence. In contrast, sheep are the dominant animals in the zooarchaeological record from about 2000 BCE onwards. The rise in the number of sheep occurred at the transition to the Middle Bronze Age (2000 BCE to 1600 BCE). At the same time, the slaughter age of the sheep shifted in a way that indicates a change from acquisition of meat (indicated by an early slaughter age) to wool (indicated by a predominance of older sheep). In the period 2000



BCE to 1600 BCE, more than 60% of the sheep were kept as adults; moreover, one third of these were male. The only reason for keeping older male sheep would be for their wool (Vretemark 2010, 164-166).

There are therefore indications of pre-existing textile production in both periods and this information does not help to narrow down the date of the loom weights.

Shape

Kneisel & Schaefer-Di Maida (2019) have presented a review of the published loom weights in the period 2200 BCE to 500 BCE in the area from the Rhine to Warta (west to east) and from Denmark to the alpine region (north to south). The study contains 6,734 loom weights of which 5,904 are identified as different types (Kneisel & Schaefer-Di Maida 2019, fig. 4.1). The pyramidal-shaped examples occurred from the Neolithic era onwards, and are the most common type with 4,167 examples (62%) on record (Kneisel & Schaefer-Di Maida 2019, 87, fig. 4.1). According to Belanová Štolcová & Grömer (2010, 16), pyramidal, spherical and discoid loom weights are the most common forms in the Late Bronze Age (1300 BCE to 800 or 750 BCE) and the Hallstatt period, whereas spherical and cylindrical are the most common in the Late Neolithic and Early Bronze Age (2300 BCE to 1600 BCE). In the Hungarian material, there are pyramidal loom weights from the excavated Middle Bronze Age layers from Százhalombatta-Földvár (Bergerbrant, forthcoming). Pyramidal loom weights have been found from the Neolithic era onwards in Hungary (Horváth & Marton 1998; Marton 2001; Ďurkovič 2015). It is clear that in central Europe during the Iron Age pyramidal-shaped loom weights were the dominant type, although other forms existed as well (Banck-Burgess 2018, 5; Kneisel & Schaefer-Di Maida 2019, 86). The loom weights also reduced in size and, for example, became narrower in the Iron Age than they were in the Urnfield period (Banck-Burgess 2018, 5).

At the Middle Bronze Age (1600-1350 BC) settlement site Montale in Italy, five different types have been identified: truncated pyramidal, bell-shaped, ring-shaped, bun-shaped and cylindrical (Sabatini 2019, 46). Of the 95 loom weights, only three are pyramidal (Sabatini 2019, 46-59). In Italy, pyramidal loom weights became the most common type during the first millennium BCE (Gleba 2008, 131).

Pyramidal loom weights are found at some sites in the eastern Mediterranean from the end of the Neolithic era (Burke 2010, 24) and exist at sites during the Bronze Age (Andersson Strand & Nosch 2015). They can be found at Quartier Mu, Malia, Crete (Poursat et al. 2015, 229-270), Archontiko (Papadopoulou et al.

2015, 294-295), Sigagroi (Elster et al. 2015, 304-305), Troia (Guzowska et al. 2015, 321), Apliki (Smith et al. 2015a, 331) and Kition (Smith et al. 2015b, 340).

According to Belanová Štolcová & Grömer (2010, 16, fig. 3.9) flat oval weights with a hole on top also existed in the Late Bronze Age and the Hallstatt period. They were produced in the central European tradition and now identified as disc-shaped (Belanová Štolcová & Grömer 2010, 16, fig. 3.9). It would be surprising if the authors had put discoid loom weights similar to the types under discussion here into any of the other categories. However, as there is no written description of the type, it is difficult to be certain.

Discoid loom weights are common in the Mediterranean Bronze Age (Andersson Strand & Nosch 2015), whereas in central Europe, as argued above, they appear to first become common in the Hallstatt period. The current survey of discoid loom weights in central Europe shows that they are more common during the Hallstatt period than in the Bronze

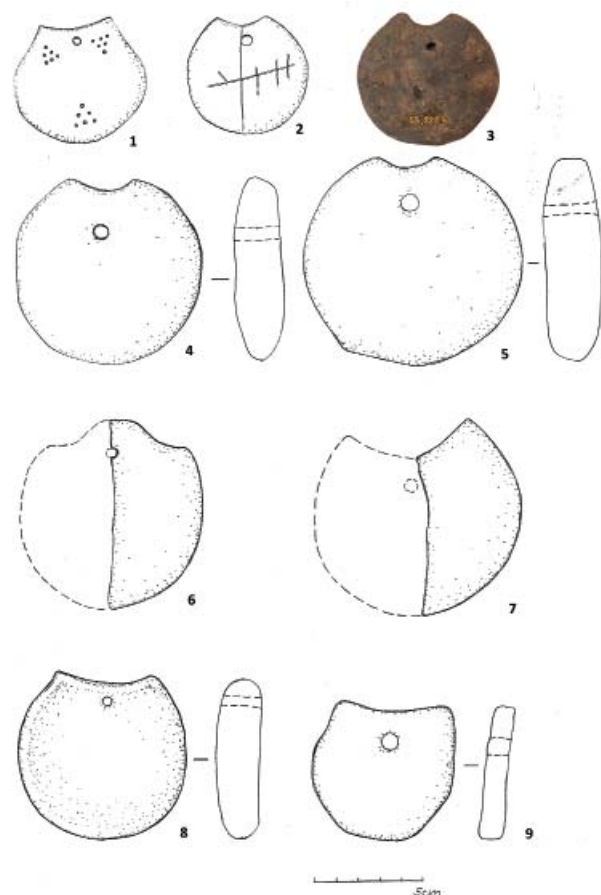


Fig. 9: Early Iron Age loom weights from Hungary: 1 & 2) Somló (Patek 1968: Pl. LIV.10-11); 3) Süttő (note image is not to scale, the diameter is 9 cm); 4 & 5) Tata (Vadász 2003); 6 & 7) Koroncó (Mithay 1970); 8) Halimba (Lengyel 1959); 9) Kajárpéc (Németh 1996)

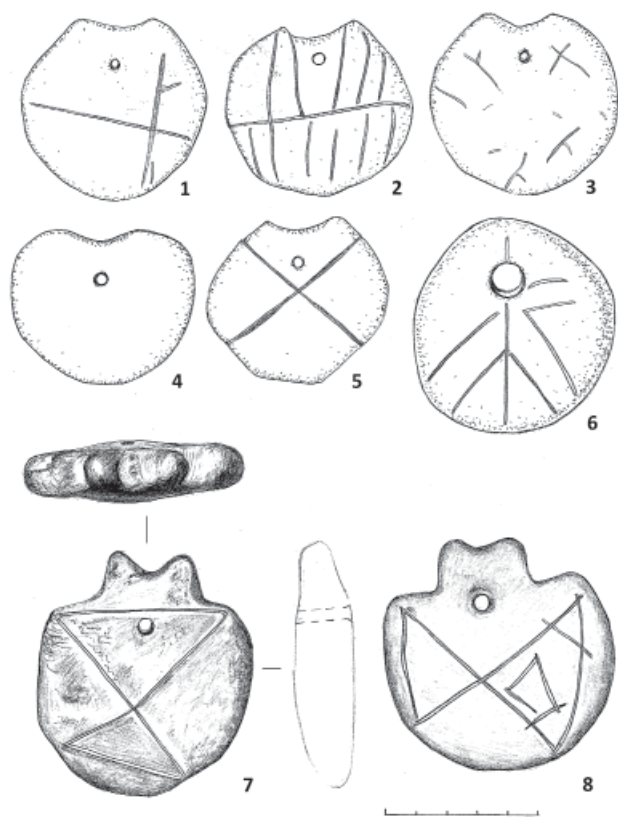


Fig. 10: Examples of incised decorations on different types of discoid loom weights: 1 to 5) Svodín, Slovakia; 6) Górkápolnahalom; 7 to 9) Százhalombatta-Földvár (Image: 1-5) after Němejcová-Pavúková, 1986; 6) after Marton 2001, 7-8 Sophie Bergerbrant)

Age (Belanová Štolcová & Grömer 2010, 16; Kneisel & Schaefer-Di Maida 2019, fig. 4.2). The best and most numerous comparisons for type A from within the wider eastern Hallstatt cultural area are the flat and heart-shaped loom weights found at Molpír (Belanová Štolcová & Grömer 2010, 16; for Hungarian examples see table 3 and fig. 9) or the completely rounded ones from Devín (Studeníková 1993) type E, which would indicate a Hallstatt period date for these finds (fig. 10). Ďurkovič (2015, 89) argues that the pyramidal and discoid loom weights are characteristic for the Early Iron Age in the north-western parts of the Carpathian Basin. Therefore, the combination of pyramidal and discoid loom weights in this study would indicate an Early Iron Age date.

Marks

Marks in the form of crosses and dots are common on loom weights in eastern Hallstatt Culture (Belanová Štolcová & Grömer 2010, 16; Grömer 2012, 54). Simple marks on the top of the surface are also common in Italy (Gleba 2008, 134-135). The different types of marks

found on the loom weights from Nové Košariská, Slovakia (Belanová Štolcová 2012, 313), from Győr-Ménfőcsanak, Hungary (Ďurkovič 2015, 100-103) and Százhalombatta-Földvár cannot be connected to any specific weight group. Their meaning is therefore difficult to understand. It has been suggested that marks on top of pyramidal weights could be production marks or aids in weaving a pattern (Belanová Štolcová 2012, 313). The marked pyramidal loom weights from Százhalombatta-Földvár do not provide any further information which could help in understanding their meaning.

In Italy, there are also loom weights with more advanced forms of decoration (Gleba 2008, 135-136). In the case of the loom weights from Százhalombatta-Földvár which have been studied, it could be argued that the shapes of some of the discoid loom weights are decorative. However, the difference in their shape could have a similar function to their decoration, which, in keeping with that on the pyramidal loom weights, could have provided some aid to weaving. It must be noted here that the incised decoration on these loom weights is more complex in design than the ones on the pyramidal weights (fig. 10). The crosses, Xs, Is and small, round depressions on the top of some of the pyramidal loom weights seem to indicate they belong to an eastern Hallstatt culture group and date.

Weight

The loom weights in this study differ from the loom weights found during excavations of the Bronze Age tell levels (Bergerbrant, forthcoming). Even though the loom weights found in the excavated layers are all pyramidal, none are as light as these (Bergerbrant, forthcoming). Light weights from the Bronze Age exist in many other areas - in, for example, Minoan Knossos. The spherical loom weights weigh from 86 g to 710 g and, of these, ten (11%) weigh between 86 g and 130 g (Burke 2010, 51-53), which puts them in the light category. A number of eastern Mediterranean sites have produced light loom weights (Andersson Strand & Nosch 2015) - for example, the area Quartier Mu, Malia, in Crete has more than 600 loom weights. The site has different loom weight clusters, in one of which the loom weights weigh between 75 g and 150 g. The weights are of many different shapes (Poursat et al. 2015). Most of the loom weights that are complete or sufficiently preserved to estimate complete weight in the Centre for Textile Research database (from the eastern Mediterranean, which is the basis for Andersson Strand & Nosch's 2015 publication) are loom weights less than 400 g, with an emphasis on

No of loom weights	Site name	Diameter (cm)	Reference
23	Százhalombatta	5.2-8	This article
1	Budapest-Harsánylejtő	~ 6	Zsidi 2017, 62-63
1	Nagybörzsöny-Rustok-hegy	8.5	Matuz & Nováki 2002, fig. 115, 4
10	Tata	8.5-10	V. Vadász 2003, T. 5
5	Süttő	8.6-11.2	Unpublished museum collection
1	Kajárpéc	6.7	T. Németh 1996, fig. 4:22
1	Koroncó-Újtelep	~ 8.5-9.5	Mithay 1970, 10, fig. 2, 13
3	Halimba	7.8	Lengyel 1959, T. XLVII, 5-6 & 8
5	Somló	~ 5.5-6	Patek 1968, T. LXX

Table 3: Early Iron Age sites in Hungary with discoid loom weights of Type A

weights in the range 100 g to 400 g. Of the 2,280 data points, about 160 weigh less than 50 g, and the ranges 50 g to 100 g and 100 g to 150 g include about 480 loom weights each. These numbers are estimates because they are presented in a table without exact numbers (Firth 2015, 164-165).

Of the loom weights found on the Po Plain in Italy belonging to the Middle Bronze Age studied by Sabatini (2019), all but three weighed between 287 g and 1230 g. The three exceptions weigh between 134 g and 150 g. In the Late Bronze Age (1350 BCE to 1150 BCE), the weights in the area seem to get heavier (Sabatini 2019). The weights published in Bazzanella (2012, 211) for Neolithic and Bronze Age Italy are consistent with the main weights in the Po Plain. Lighter loom weights, with the exception of the three noted by Sabatini (2019), weighing from

20 g seem to appear in the Final Bronze Age in Italy (Gleba 2008, 135).

According to Belanová Štolcová & Grömer (2010, 17), there is no significant change in weight between the Neolithic, Bronze Age and Urnfield, Hallstatt period loom weights as there are some variations within the periods. At the Hallstatt period site Nové Košariská, Slovakia, 170 pyramidal loom weights were found in a house. Based on their placement in the house, they have been interpreted as the remains of two looms: one with 91 heavy loom weights of about 1,300 g each and another one consisting of 79 loom weights weighing about 600 g each (Belanová Štolcová 2012, 312). Many of the publications cited regarding loom weights in central Europe are primarily concerned with shape and do not mention the weight. It is therefore difficult to achieve a complete picture of the relevant evidence. The majority of the Early Iron Age (HaC) loom weights at Győr-Ménfőcsanak are pyramidal and generally weigh between 960 g and 1,690 g, with the majority between 1,300 g and 1,690 g (Ďurkovič 2015). The examples from the Middle to Late Iron Age (HaC2-D2) site in Górkápolnadomb, Hungary, weigh from 1,200 g to 1,750 g (Marton 2001) and are therefore regarded as heavy. Examples of light loom weights can be found in the eastern Hallstatt area, for example, the 50 small flat discoid loom weights that weigh between 45.6 g and 157.9 g at Smolenice-Molpír (Belanová Štolcová 2012, 311). Another example is the single light pyramidal loom weight found at the Hungarian settlement Győr-Ménfőcsanak that weighs 112 g (Ďurkovič 2015, 91, 103).

Although light loom weights are present in the eastern Mediterranean from the Bronze Age (Burke 2010; Andersson Strand & Nosch 2015), the lighter loom weights, at less than 130 g, seem not to make their appearance in central Europe until the Late Bronze Age or Early Hallstatt period based on this

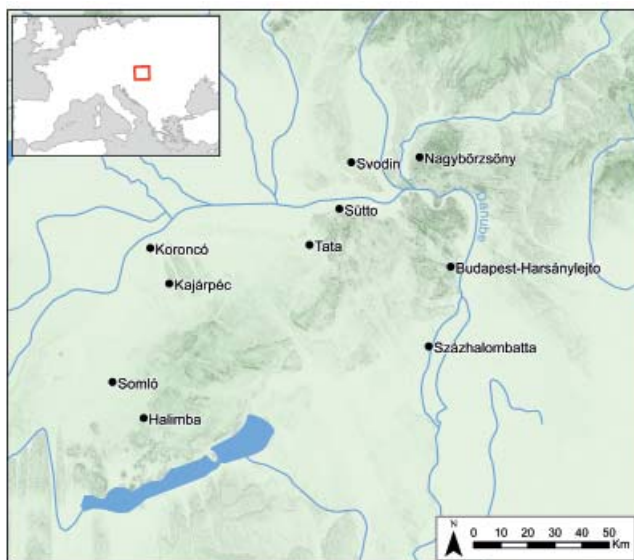


Fig. 11: Map showing the Hungarian sites with discoid loom weights (Image: Sophie Bergerbrant)



literature review. Taken together, these point to a Hallstatt period date for the light loom weights from Százhalombatta-Földvár.

Date

Pyramidal loom weights seem to be the most common both in number and distribution in central and northern Europe, whereas the discoid type is limited to the eastern Alps and Czech Republic according to Kneisel & Schaefer-Di Maida (2019, 88 & 90). The small discoid loom weights seem to have a clear connection to the eastern Hallstatt culture, though at Százhalombatta-Földvár, there is one example of this type (type E). However, there are similar loom weights to types A and B presented here (fig. 4A and fig. 4B) from other hilltop settlements such as Smolenice-Molpír (Belanová Štolcová 2012, 311-312) and from burials such as Svodín (Němejcová-Pavúková 1986, 196, fig. 19: 1-6) and Tata (Vadász 2003, Plate V.), which seem to suggest a Hallstatt period date.

In addition to the previously discussed typochronological parallels of the loom weights from Százhalombatta, a detailed visual analysis of the clay fabric was undertaken. This concluded that the type, quality, quantity and composition of temper used for these loom weights is in line with the local Iron Age ceramic tradition.

Textile production in eastern Hallstatt area

The Hallstatt period has an unusually large number of preserved textiles. This is partly due to the finds from the Hallstatt salt mines (Grömer 2012, 42-43). Textile remains from graves also exist in other areas in Austria (Grömer 2012, 43-44; Grömer et al. 2013), Germany (Banck-Burgess 2012), Hungary (Bender Jørgensen 2005, 141-142), Czech Republic, Slovakia (Belanová Štolcová 2012, 310), and Slovenia (Bender Jørgensen 2005).

The textiles themselves are very varied and attest to the use of many weaving types, such as tabby, twill and diamond twill (Grömer 2012, 42-43). The main weave became 2/2 twill, and the fibres used were wool, linen and hemp as well as other fibres (Bender Jørgensen 2005, 138). The Hallstatt period has spin pattern twills that almost vanished with the La Tène period (Bender Jørgensen 2005, 138; Grömer 2012). In the La Tène period the textiles seem to become more uniform and possibly coarser (Bender Jørgensen 2005, 138, Belanová Štolcová 2012; Grömer 2012). Banck-Burgess (2018, 6) concludes that some of the textiles such as pieces from Hochdorf show that they were produced by specialists who contributed to the regional power structure and economy.

Spindles and occasionally loom weights can be found in graves from the period (Vadász 2003; Grömer 2012, 54; Belanová Štolcová 2012, 312; Banck-Burgess 2018, 4; Metzner-Nebelsick 2018, 16) and show the importance of the craft. The illustrations of individuals that spin or weave, such as on the conical necked vessel from Sopron-Burgstall (Grömer 2012, 58) and the Tintinnabulum, Bologna (Gleba 2008, 30) indicate that it was a female craft. Metzner-Nebelsick (2018, 16) connects the presence of spindle whorls and loom weights in some female Kalenderberg graves, a sub-group of eastern Hallstatt culture in Austria and Hungary, with their involvement in textile production and the social role as lady of the house. The importance of the craft is probably indicated in the conical-necked vessel from Sopron-Burgstall (Grömer 2012, 58). It is possible that the presence of textile tools in rich female graves is connected to control over textile production. Banck-Burgess (2018, 6) argues that Iron Age textile production centres are difficult to document based on settlement evidence. Although Belanová Štolcová & Grömer (2010, 9-20) view it differently and interpret the site Smolenice Mopír (with more than 2,100 spindle whorls and a large number of loom weights) as a textile production centre. Webley (2018, 15) argues that crafts, including textile production, are often carried out at a household level. He suggests that the common finds of spindle whorls and loom weights prove this.

The looms used in the eastern Hallstatt area could be fairly large, up to 4 m, based on the loom weights which are interpreted to be their remains (Belanová Štolcová 2012, 312-313; Belanová Štolcová & Grömer 2010, 16; Grömer 2012, 54). These looms seem to have had weights mainly in the range 350 g to 1,600 g (see above). The lighter weight group in this study (51 g to 135 g) seems to be less common, and seldom found in as large numbers as in Százhalombatta. The large looms are found both at hillforts and other types of settlements (Belanová Štolcová 2012, 313), indicating that weaving large textiles was not confined to the hillforts.

Traces of a small settlement outside the walls at the Százhalombatta-Sánc-hegy have been found (Poroszlai 1999, 16). However, the loom weights here were most probably found in an area within the hillfort's wall but farther away from the dense household area in the centre. Private or illicit excavations were known to be primarily carried out within the fortification walls. The name given as the find spot by the donor of these loom weights (Földvár) indicates the southern part of the Bronze and Iron Age site complex. The donor is the landowner of this particular part of the



site and the objects were found while he was working on his land. Current knowledge suggests it seems that the northern part (Sánc-hegy) consists of dense Iron Age settlement features without any Middle Bronze Age remains. This part is considered to have been the centre of the Iron Age hillfort. The southern part is where the Middle Bronze Age tell is, and it also contains scattered Hallstatt period and Celtic remains, which are clearly not as abundant as in the northern part.

The site Smolencie-Molpír, which seems to have fairly similar loom weights to those of Százhalombatta, is situated between two cultural spheres (north-east alpine Hallstatt and the Lusatian culture) and suggests that the site participated in long-distance trade (Belanová Štolcová 2012, 312). The Hallstatt period Százhalombatta-Sánc-hegy is not as well excavated (Marton 1999) but its strategic situation by the Danube and the finds from the nearby large Hallstatt cemetery (Czajlik 2008, 97; Poroszlai 1999, 376) suggest that the site could have been an important part of a long-distance network, probably similar to Smolencie-Molpír. An important difference so far is that Smolencie-Molpír has revealed around 2,100 spindle whorls (Belanová Štolcová 2012, 311). Only a few spindle whorls have been collected from the Százhalombatta site complex or given to the museum. From the casual finds, only about ten spindle whorls have been donated to the museum. While all the light discoid loom weights were given to the museum in 1987, the pyramidal loom weights were passed to the museum sporadically between 1987 and 1992 in three batches. Without further details about the find spots, it is difficult to say with confidence whether or not they all came from a limited area, such as a workshop or artisan's location.

Conclusion

Comparison with loom weights from dated contexts and a review of the site suggests that the light loom weights in this study most likely belong to the Hallstatt period. It seems that weaving on large looms was an activity known during this period. As the Iron Age hillfort (Százhalombatta-Sánc-hegy) only had limited excavations, it is not possible to say whether there would have been a large loom with heavier weights at the site at this time. The large number of light loom weights (more than 180) might indicate that textile production was an important factor in Százhalombatta-Sánc-hegy as well. However, without more extensive excavations of the hillfort, this is difficult to establish with certainty.

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