# Grčki keramički utezi za tkalački stan iz Fara na otoku Hvaru

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# SADRŽAJ
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# GRČKI KERAMIČKI UTEZI ZA TKALAČKI STAN IZ FARA NA OTOKU HVARU

# GREEK CERAMIC LOOM WEIGHTS FROM PHAROS ON THE ISLAND OF HVAR

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**Tekstil se rijetko sačuva u arheološkim kontekstima te se češće koriste indirektni dokazi kako bi se utvrdile relevantne informacije o raširenosti i opsegu proizvodnje, ali i društvenim, gospodarskim i drugim kulturnim implikacijama koje se mogu iščitati iz predmeta korištenih za izradu tekstila. Jedni od najbrojnijih pokazatelja proizvodnje različitih vrsta tekstila su keramički utezi za vertikalni tkalački stan. Ovom prilikom, predstavit će se ukupno 48 grčkih utega prikupljenih prilikom zaštitnih istraživanja 1989. godine na poziciji Vukovarska 2 u Starome Gradu na otoku Hvaru. Utezi su otkriveni unutar grčke strukture, te se na temelju ostalih pronađenih pokretnih nalaza mogu datirati u kraj 4., odnosno početak 3. st. pr. Kr. Zastupljeni su piramidalni, konični, trapezoidni i diskoidni oblici, a posebno se ističe veliki postotak oznaka na njima u vidu otisaka gema i ureza simbola ili slova. Keramički utezi iz Vukovarske 2 pružaju vrijedne informacije o tkalačkom zanatu, kao i mogućnost sagledavanja njegovih najranijih faza razvoja u kontekstu grčkog grada Fara.**

**KLJUČNE RIJEČI: Far, otok Hvar, grčki keramički utezi, vertikalni tkalački stan, hipokamp**

Textiles are rarely preserved in archaeological contexts, so indirect evidence is often used to establish relevant information about the distribution and extent of production, as well as the social, economic, and other cultural implications that can be inferred from the objects used to manufacture textiles. Some of the most abundant indicators of textile production are ceramic weights for vertical looms. This paper discusses 48 Greek loom weights discovered during rescue excavations in 1989 at the site of Vukovarska 2 in Stari Grad on the island of Hvar. These loom weights were found within a Greek structure and, based on associated artifacts, are dated to the late 4$^{th}$ or early 3$^{rd}$ century BC. The loom weights are of pyramidal, conical, trapezoidal, and discoid shapes, with a significant number of markings, including gem impressions and engraved symbols or letters. These findings offer valuable insights into ancient weaving techniques and provide an opportunity to analyse the early stages of textile production in the Greek city of Pharos.

KEY WORDS: Pharos, island of Hvar, Greek loom weights, vertical loom, hippocampus

## KONTEKST NALAZA

**Prilikom iskopa septičke jame na poziciji Vukovarska 2 u Starome Gradu na otoku Hvaru, slučajno su otkriveni ostaci grčke strukture i pokretni nalazi u konobi stambene kuće (karta 1). Izvršena su zaštitna arheološka istraživanja 1989. godine čiji je nositelj bio Regionalni zavod za zaštitu spomenika u Splitu. Dokumentirani su ostaci grčke arhitekture koji se sastoje od dva zida koji zatvaraju jugozapadni kut građevine, sačuvane u visini od oko 0,50 m (Jeličić Radonić 1995: 103–104). Unutar prostorije otkriven je veliki kameni blok, za koji se pretpostavlja da bi mogao biti dislocirani prag. Među pokretnim nalazima, posebno se izdvaja velika količina utega prikupljenih u paljevinskom sloju. U objavi spomenutih istraživanja Jasna Jeličić Radonić, voditeljica istraživanja, navodi kako se radi o ukupno 49[1] utega koji su bili „grupirani i razbacani" unutar zidova strukture, pomiješani s paljevinskim slojem što potvrđuju i pojedini utezi na kojima je jasno vidljivo djelovanje vatre (T. 5: 1–2). Ista autorica spominje i željeznodobnu, odnosno „ilirsku" keramiku koja je zajedno s grčkim materijalom otkrivena u paljevinskom sloju (Jeličić Radonić 1995: 104). Nažalost, zbog nedostatka podataka unutar dostupne objave istraživanja, nije moguće odrediti opseg paljevinskog sloja unutar strukture, niti koji su sve nalazi otkriveni u njemu.**

**Osim utega, među nalazima unutar strukture spominju se ostaci luterija, pitosa, te ulomci crnopremazane i slikane keramike (Jeličić Radonić 1995: 103). Luterij (*louterion*), odnosno posuda za pranje, se u kućanstvima koristio u svakodnevne svrhe, no isti takav predmet koristio se i u svetištima kao posuda za obredno pranje, odnosno škropljenje te u tom slučaju nosi naziv *perirrhanterion*. Razliku čini samo kontekst nalaza, te je često teško odrediti radi li se o predmetu profane ili sakralne namjene (Radić 1988: 37; Jeličić Radonić 1995: 63).**

**Zbog nedostatka detaljnih podataka, nije moguće odrediti ulogu strukture, no raznovrsnost nalaza mogla bi sugerirati da se radi o kućanstvu. Veća koncentracija keramičkih utega**

1 Jeličić Radonić 1995: 103, no na str. 113 navodi kako se radi o 58 utega. S obzirom na činjenicu da su utezi otkriveni i u dvorištu stambene kuće u Vukovarskoj 2, moguće je da su oni uračunati u navedeni broj. U Muzeju Staroga Grada nalazi se ukupno 48 utega koji se mogu povezati s istraživanjima u Vukovarskoj 2.

## THE CONTEXT OF THE DISCOVERY

During the construction of a septic tank at Vukovarska 2 in Stari Grad on the island of Hvar, remains of a Greek structure and various artefacts were accidentally discovered in the cellar of a residential house (Map 1). Rescue excavations were conducted in 1989 by the Regional Institute for the Protection of Monuments in Split. The discovered remains of Greek architecture include two walls forming the southwest corner of the building, preserved to a height of approximately 0.50 m (Jeličić Radonić 1995: 103–104). A large stone block, believed to be a dislocated threshold, was found inside the room. Among the artefacts, a significant number of loom weights were uncovered within the layer of burnt debris. In the publication detailing these excavations, the excavation leader, Jasna Jeličić Radonić, reported the discovery of a total of 49[1] loom weights, which were both "grouped and scattered" within the walls of the structure, mixed with the burnt debris, as confirmed by some loom weights showing visible traces of burning (Pl. 5: 1–2). The same author also refers to Iron Age, or "Illyrian", pottery found alongside Greek artefacts within the layer of burnt debris (Jeličić Radonić 1995: 104). Unfortunately, due to insufficient information in the available research publication, it is impossible to ascertain the full extent of the layer of burnt debris within the structure or to identify all the artefacts found within it.

In addition to the loom weights, fragments of a louterion, pithos, and black-coated and painted ware were also reported among the artefacts discovered inside the structure (Jeličić Radonić 1995: 103). The louterion, or washbasin, was commonly used in households for everyday tasks; however, it also served as a ritual washing vessel in sanctuaries, known as a perirrhanterion. The distinction lies solely in the context of the find, which often makes it challenging to determine whether the object served a secular or sacred purpose (Radić 1988: 37; Jeličić Radonić 1995: 63).

Given the limited data available, we cannot conclusively determine the function of the structure. However, the range of artifacts found may indicate that it served as a household. The higher concentration of ceramic loom weights suggests the

1 Jeličić Radonić 1995: 103, but they state on page 113 that there are 58 loom weights. Given that loom weights were also discovered in the yard of the residential house at Vukovarska 2, it is possible that they are included in this number. A total of 48 loom weights have been identified in the Stari Grad Museum that can be connected to the excavation at Vukovarska 2.


Karta 1 – Stari Grad na otoku Hvaru s položajem nalazišta Vukovarska 2 (podloga: DOF 1 : 5000, Geoportal DGU; digitalna obrada: M. Korić)
Map 1 – Stari Grad on the island of Hvar with the position of site Vukovarska 2 (base: DOF 1:5000, Geoportal DGU; digital processing: M. Korić)

**upućuje na korištenje tkalačkog stana, no, osim količine nalaza, nema nedvosmislenog dokaza njegovog postojanja (Miszk 2012: 120–122). Bez podataka o poziciji nalaza, nije moguće odrediti radi li se o postavljenom tkalačkom stanu, spremljenim utezima ili o nekoj drugoj funkciji utega (Cahill 2002: 171–173; Gleba, Mannering 2012: 15).**

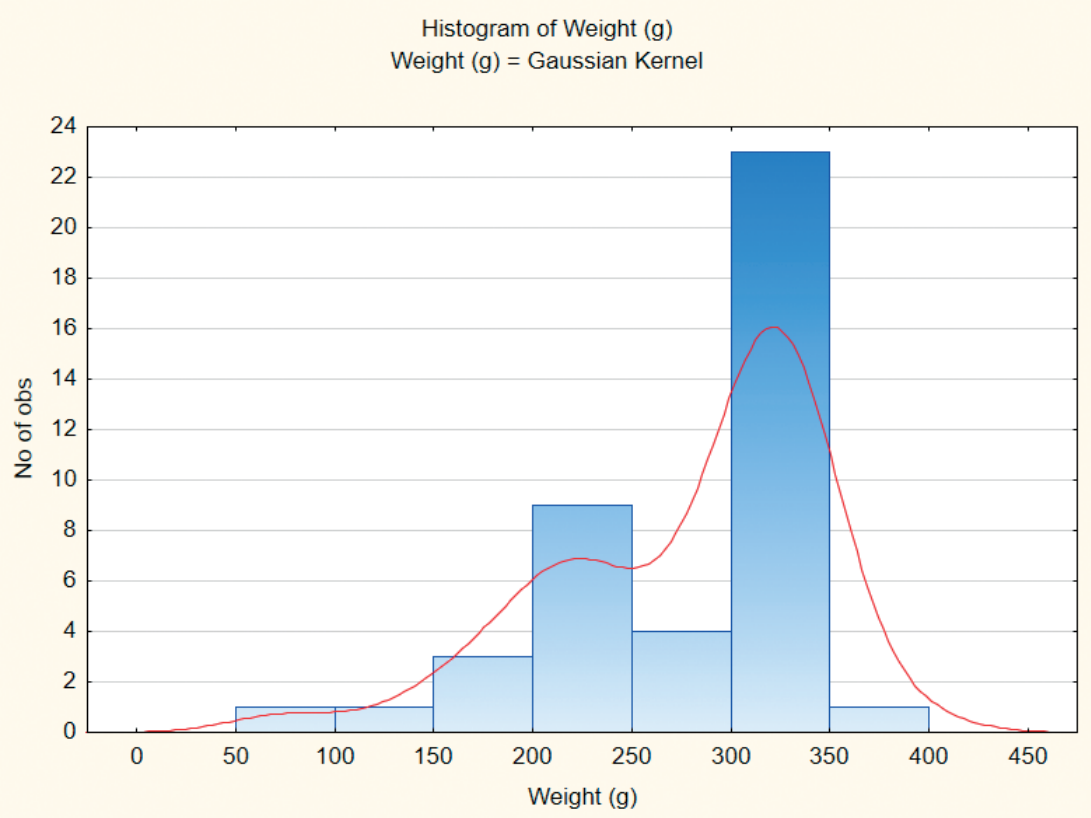
## TIPOLOGIJA

**Ukupno 48 keramičkih utega koji su otkriveni na lokaciji Vukovarska 2, može se svrstati u 4 grupe prema obliku. Najbrojniji su piramidalni, zatim konični, dok su trapezoidni i diskoidni zastupljeni s po dva primjerka. Utezi su raznih dimenzija, te težine cjelovito sačuvanih primjeraka variraju od 76,3 do 386,9 g, s time da većina pripada rasponima od 194,2 do 230,8 g i od 273 do 341,9 g (sl. 1).**

presence of a loom; nonetheless, there is no definitive evidence supporting its existence beyond the sheer number of artifacts (Miszk 2012: 120–122). Without information regarding the position of the loom weights inside the structure, it is unclear whether they belong to a complete loom setup, are stored loom weights, or pertain to another function (Cahill 2002: 171–173; Gleba, Mannering 2012: 15).

## TYPOLOGY

A total of 48 ceramic loom weights discovered at the site of Vukovarska 2 can be classified into four distinct groups according to their shape. Pyramidal weights are the most numerous, followed by conical, while trapezoidal and discoid shapes are represented by two specimens each. The loom weights vary in size, and the weights of fully preserved specimens range from 76.3 to 386.9 g, with the majority falling within the ranges of 194.2 to 230.8 g and 273 to 341.9 g (Fig. 1).




Sl. 1 – Histogram s prikazom distribucija težina keramičkih utega iz Vukovarske 2 (izradila: M. Korić)
Fig. 1 – Histogram showing the weight distributions of ceramic loom weights from Vukovarska 2 (made by: M. Korić)

## Piramidalni utezi (T. 1–4)

**Piramidalni utezi čine najbrojniji oblik zastupljen na nalazištu Vukovarska 2, a radi se o ukupno 26 nalaza. Težine cjelovito sačuvanih utega variraju između 216,6 i 337,3 g, visine između 89 i 99 mm, maksimalna širina imeđu 53 i 63 mm a maksimalna debljina između 47 i 65 mm. Izdvaja se jedan djelomično sačuvan uteg manjih dimenzija, visine 58 mm, maksimalne širine i debljine 35 mm, kojemu nije moguće precizno odrediti prvotnu težinu, no može se pretpostaviti da je manja od 100 g (s obzirom na činjenicu da sačuvana težina iznosi 71,1 g, a nedostaje samo manji dio utega; T. 4: 3). Svi utezi sadrže jednu perforaciju pri vrhu, s rangom promjera od 4 do 6 mm. Većina piramidalnih utega sadrži neku vrstu oznake, odnosno, od 26 utega označeno ih je 18.**

## Pyramidal loom weights (Pl. 1–4)

Pyramidal loom weights are the most prevalent type found at the Vukovarska 2 site, with a total of 26 specimens recovered. The completely preserved loom weights range in mass from 216.6 to 337.3 g, with heights between 89 and 99 mm, maximum widths between 53 and 63 mm, and maximum thicknesses from 47 to 65 mm. Notably, one partially preserved loom weight measures 58 mm in height, with maximum width and thickness of 35 mm. Its original weight is uncertain, but it is likely less than 100 g, given that the preserved weight is 71.1 g and only a small portion is missing (Pl. 4: 3). Each loom weight features a single perforation near the top, with diameters ranging from 4 to 6 mm. Among these 26 loom weights, 18 bear distinct markings.

### Konični utezi (T. 5–6)

**Ukupno je otkriveno 18 koničnih utega, od kojih je većina cjelovito sačuvana. Težine cjelovito sačuvanih utega variraju od 140,7 do 386,9 g, visine između 72 i 97 mm, a maksimalni promjer između 51 i 71 mm. Svi utezi sadrže jednu perforaciju pri vrhu, s rangom promjera od 4 do 7 mm. Ponovno većina utega sadrži neku vrstu oznake, odnosno, od 18 utega označeno ih je 13. Zanimljivo je kako dio utega ima udubljenje na donjem dijelu, koje bi moglo upućivati na način izrade, odnosno, da su izrađeni korištenjem kalupa (T. 5; 6: 5) (Davidson, Thompson 1975: 72).**

### Trapezoidni utezi (T. 7: 1–2)

**Dva trapezoidna utega različitih su dimenzija i oznaka. Jedan uteg je manji, težine 76,3 g, visine 61 mm, maksimalne širine 41 a debljine 31 mm, te je označen urezanim slovima ispod perforacija (T. 7: 1). Drugi uteg, težine 244,6 g, visine 83 mm i maksimalne širine i debljine 50 mm, sadrži ukupno pet otisaka geme na različitim stranama (T. 7: 2). Oba utega imaju dvije perforacije, s rangom promjera od 3 do 5 mm.**

### Diskoidni utezi (T. 7: 3–4)

**Otkrivena su dva diskoidna utega, jedan je lećastog presjeka (T. 7: 3), dok je drugom utegu zadebljan i poravnat donji dio (T. 7: 4), što bi mogao biti rezultat procesa izrade, odnosno sušenja u vertikalnom položaju. Utezi su vrlo sličnih dimenzija, promjera oko 80 mm, debljine od 27 i 30 mm te težine od 168,2 i 173,4 g.**

## RASPRAVA

### Izrada tkanine

**Utezi su na tkalačkom stanu služili za napinjanje niti osnove kako bi se provlačenjem potke omogućila izrada tkanina (Gleba 2008: 250). Broj niti osnove koje se vežu uz jedan uteg ovisi o njihovoj težini, odnosno potrebnoj napetosti. Eksperimenti provedeni u sklopu istraživačkog projekta *Tools and Textiles – Text and Context* (TTTC) Danske nacionalne zaklade za istraživanja (Mårtensson et al. 2009; Andersson Strand 2012; Olofsson et al. 2015), pokazali su kako je tkanje izvedivo s 5**

### Conical loom weights (Pl. 5–6)

A total of 18 conical loom weights were found, most of which are fully preserved. The weights of these intact pieces range from 140.7 to 386.9 g, with heights between 72 and 97 mm and maximum diameters between 51 and 71 mm. Each loom weight has a single perforation near the top, with diameters varying from 4 to 7 mm. Thirteen of the loom weights exhibit some form of marking. Interestingly, some loom weights exhibit an indentation on the lower surface, suggesting they may have been produced using a mould (Pl. 5; 6: 5) (Davidson, Thompson 1975: 72).

### Trapezoidal loom weights (Pl. 7: 1–2)

Two trapezoidal loom weights of differing sizes and markings were identified. The smaller loom weight weighs 76.3 g, stands 61 mm tall, and has a maximum width of 41 mm and a thickness of 31 mm. It bears incised letters below the perforation (Pl. 7: 1). The second loom weight weighs 244.6 g, is 83 mm high, and has a maximum width and thickness of 50 mm. It features five gem impressions on various sides (Pl. 7: 2). Both trapezoidal loom weights have two perforations with diameters ranging from 3 to 5 mm.

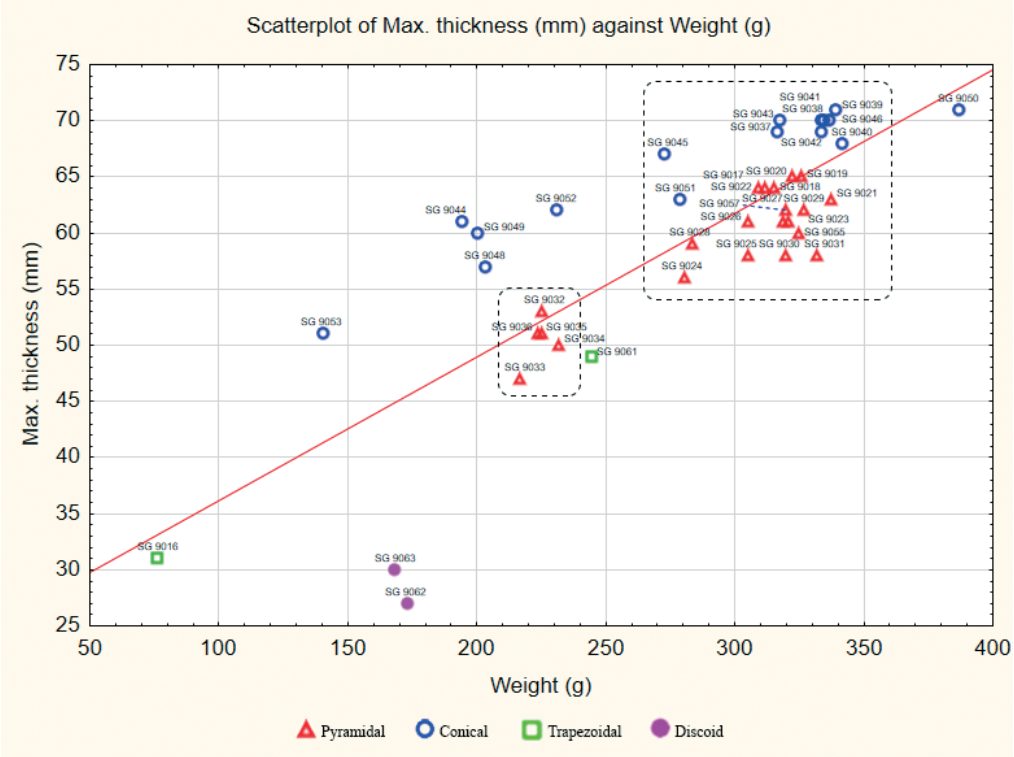
### Discoid loom weights (Pl. 7: 3–4)

Two discoid loom weights were recovered. One exhibits a lenticular cross-section (Pl. 7: 3), while the other has a thickened, flattened lower part that may have resulted from vertical drying during manufacture (Pl. 7: 4). These loom weights have very similar dimensions, with a diameter of approximately 80 mm, thicknesses of 27 and 30 mm, and weights of 168.2 and 173.4 g.

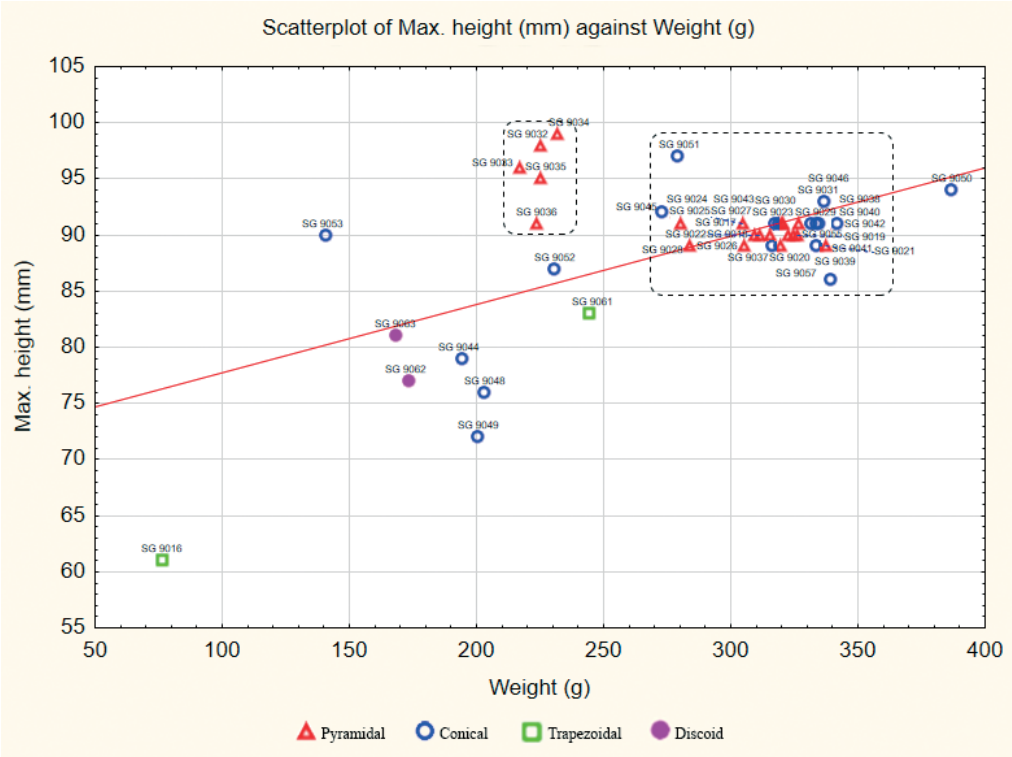
## DISCUSSION

### Fabric production

Loom weights were used on vertical looms to apply tension to the warp threads, facilitating the production of fabrics by drawing the weft through (Gleba 2008: 127). The number of warp threads attached to a loom weight depends on their weight, which dictates the necessary warp tension. Research conducted by the *Tools and Textiles – Text and Context* (TTTC) project, under the auspices of the Danish National Research Foundation (Mårtensson et al. 2009; Andersson Strand 2012; Olofsson et al. 2015), demonstrated that weaving is viable with 5




Sl. 2 – Dijagram raspršenosti keramičkih utega iz Vukovarske 2 na temelju debljina i težina (izradila: M. Korić)
Fig. 2 – Scatter plot of ceramic loom weights from Vukovarska 2 based on thickness and weight (made by: M. Korić)




Sl. 3 – Dijagram raspršenosti keramičkih utega iz Vukovarske 2 na temelju visina i težina (izradila: M. Korić)
Fig. 3 – Scatter plot of ceramic loom weights from Vukovarska 2 based on height and weight (made by: M. Korić)

**do 30 niti osnove po utegu no optimalno je oko 20–25 niti. Precizniji podaci se mogu dobiti ovisno o promjeru niti i težini utega, odnosno o napetosti koju niti osnove zahtijevaju. Osim težine, važan parametar pri proučavanju utega čini njegova debljina, jer o njoj ovisi koliko će utezi biti zbijeni na tkalačkom stanu, te time i karakter tkanine koja se proizvodi. Uz to, ukupna širina utega na tkalačkom stanu definira i ukupnu širinu tkanine (Olofsson et al. 2015: 88, 91–92).**

**Kada se usporede navedeni parametri, odnosno težina i debljina cjelovito sačuvanih utega iz Vukovarske 2, mogu se uočiti određene grupacije nalaza (sl. 2), što je još izraženije ukoliko se u obzir uzme i visina utega (sl. 3). Najznačajniju grupu čini 17 piramidalnih (T. 1–2; 3: 1–4, 6) i 10 koničnih utega (T. 5: 1–7, 9–10; 6: 4) čije težine variraju između 278,9 i 341,9 g, s prosječnom težinom od 320 g. Maksimalna debljina, odnosno promjer utega varira između 56 i 71 mm, s prosjekom od 64 mm, dok visina varira od 86 do 92 mm, s prosjekom od 90 mm. Svi utezi sadrže jednu perforaciju pri vrhu, s rangom promjera od 4 do 6 mm, dok većina sadrži oznaku u vidu otiska geme s prikazom hipokampa na gornjoj plohi.**

**Na temelju poznatih vrijednosti pojedinih utega, moguće je djelomično rekonstruirati potencijalni postav tkalačkog stana. Primjerice, na uteg težine 320 g, što je prosječna vrijednost spomenute grupe piramidalnih i koničnih utega, optimalno je vezati 21 nit osnove koje zahtijevaju 15 g napetosti (Tab. 1). Izvedivo je tkanje s 32 niti osnove koje zahtijevaju 10 g napetosti te 16 niti koje zahtijevaju 20 g, dok je tkanje s nitima koje zahtijevaju 5 g nepovoljno zbog prevelike količine niti po utegu. Isto tako, nepovoljno je tkanje s nitima koje zahtijevaju 30 i više grama napetosti, zbog premale količine niti po cm² u izrađenoj tkanini. Ukoliko bi se pretpostavilo kako utezi ove grupe čine jedan cjeloviti set utega, širina proizvedene tkanine odgovarala bi zbroju svih debljina utega raspoređenih u dva niza, odnosno oko 86 cm. No, važno je napomenuti kako se ne može sa sigurnošću tvrditi da su svi spomenuti utezi bili dio jednog seta, kao ni da se radi o cjelovitom setu.**

**Drugu, manju grupu, moglo bi činiti pet piramidalnih utega (T. 4: 4–8) uniformnih oblika i dimenzija, čije težine variraju između 216,6 i 231,6 g, s prosječnom težinom od 225 g. Maksimalna debljina utega varira između 47 i 53**

to 30 warp threads per loom weight, with an optimal range of 20–25 threads. More precise data can be ascertained by considering both the thread diameter and weight of the loom weight, as these factors influence the required warp tension. In addition to weight, thickness is a crucial parameter in studying loom weights, as it affects how compactly the loom weights can be arranged on the loom, thereby influencing the characteristics of the produced fabric. Furthermore, the overall width of the loom weights on the loom determines the final width of the fabric (Olofsson et al. 2015: 88, 91–92).

When comparing the weight and thickness of the well-preserved loom weights from Vukovarska 2, distinct groupings of finds emerge (Fig. 2). This pattern becomes even more pronounced when considering the height of the loom weights (Fig. 3). The most notable group includes 17 pyramidal (Pl. 1–2; 3: 1–4, 6) and 10 conical loom weights (Pl. 5: 1–7, 9–10; 6: 4), with weights ranging from 278.9 to 341.9 g and an average of 320 g. The maximum thickness, or diameter, of these weights varies from 56 to 71 mm, averaging 64 mm, while their height ranges from 86 to 92 mm, with an average of 90 mm. Each weight has a perforation near the top, with a diameter of 4 to 6 mm, and most feature a gem impression depicting a hippocampus on the upper surface.

Based on the known values of individual loom weights, we can partially reconstruct the potential setup of the loom. For instance, with a 320 g loom weight – representing the average weight of the mentioned group of pyramidal and conical loom weights – it is ideal to attach 21 warp threads, each requiring a tension of 15 g (Tab. 1). Weaving is feasible with 33 warp threads, each requiring 10 g of tension, or with 16 threads requiring 20 g each. However, using threads that necessitate 5 g is impractical due to the excessive number of threads per loom weight. Similarly, weaving with threads requiring a tension of 30 g or more is unfavourable because it results in an insufficient number of threads per cm² in the fabric. If we assume that the loom weights in this group comprise a complete set for the loom, the width of the produced fabric would correspond to the total thicknesses of the weights arranged in two rows, approximately 86 cm. Nevertheless, it is essential to emphasize that we cannot definitively conclude that all mentioned loom weights were part of a single set or that they constitute a complete set.

A smaller group includes five pyramidal loom weights (Pl. 4: 4–8) that are uniform in shape and dimensions, with weights ranging from 216.6 g to 231.6 g, averaging 225 g. The maximum thickness of these loom weights ranges from 47 mm to 53

**mm, s prosjekom od 50,5 mm, dok visina varira između 91 i 99 mm, s prosjekom od 96 mm. Svi utezi sadrže jednu perforaciju pri vrhu, s rangom promjera od 5 do 6 mm. Tri od navedenih pet utega sadrže urezanu liniju na gornjem dijelu, dužine 9–12 mm.**

**Na temelju prosječne težine od 225 g, može se zaključiti kako je na jedan uteg optimalno vezati 23 niti koje zahtijevaju 10 g napetosti, dok je tkanje izvedivo i s 15 niti koje zahtijevaju 15 g napetosti (Tab. 2). Tkanje s nitima koje zahtijevaju 5 g napetosti je nepovoljno zbog prevelike količine niti po utegu, kao i tkanje s nitima koje zahtijevaju 20 i više grama napetosti, zbog premale količine niti po cm² u izrađenoj tkanini. S obzirom da se radi o maloj količini utega, ne može se govoriti o cjelovitom setu za tkalački stan – smatra se kako jedan set čini 6 do 30 utega, ili čak i više (Barber 1991: 104; Gleba, Mannering 2012: 15–16; Ferrara, Meo 2017: 123).**

**S obzirom na nedostatak podataka o točnom rasporedu nalaza unutar strukture, nije moguće odrediti da li su i koji su utezi činili set za tkalački stan, posebno kada se uzmu u obzir**

mm, with an average of 50.5 mm. The height varies from 91 mm to 99 mm, with an average of 96 mm. Each loom weight features a perforation near the top, with diameters ranging from 5 mm to 6 mm. Furthermore, three of the five loom weights have an incised line on the upper surface, measuring between 9 mm and 12 mm in length.

Based on an average weight of 225 g, it is optimal to attach 23 threads that require a tension of 10 g to each loom weight. Weaving is also feasible with 15 threads requiring a tension of 15 g (Tab. 2). However, using threads that require a tension of only 5 g is less advantageous due to the excessive number of threads per loom weight. Similarly, threads requiring a tension of 20 g or more do not provide a sufficient amount of thread per cm² in the produced fabric. Given the limited number of loom weights, it cannot be claimed that this constitutes a complete set for the loom; typically, a complete set would comprise between 6 and 30 loom weights or more (Barber 1991: 104; Gleba, Mannering 2012: 15–16; Ferrara, Meo 2017: 123).

Due to insufficient information regarding the precise location of the finds within the structure, it is challenging to ascertain which, if any,

| Grupa 1 / Group 1 | Prosječna težina / Average weight: 320 g; Prosječna debljina / Average thickness: 6,4 cm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Potrebna napetost niti osnove / Required tension of warp threads | 5 g | 10 g | 15 g | 20 g | 30 g | 40 g | 50 g | 60 g |
| Broj niti osnove po utegu / Number of warp threads per loom weight | 320/5 = **64** | 320/10 = **32** | 320/15 ≈ **21** | 320/20 = **16** | 320/30 ≈ **10,5** | 320/40 = **8** | 320/50 ≈ **6,5** | 320/60 ≈ **5** |
| Broj niti osnove po 2 reda utega / Number of warp threads per 2 rows of loom weights | 65 x 2 = **128** | 32 x 2 = **64** | 21 x 2 = **42** | 16 x 2 = **32** | 10,5 x 2 = **21** | 8 x 2 = **16** | 6,5 x 2 = **13** | 5 x 2 = **10** |
| Broj niti osnove po cm² / Number of warp threads per cm² | 128/6,4 = **20** | 64/6,4 = **10** | 42/6,4 ≈ **6,5** | 32/6,4 = **5** | 21/6,4 ≈ **3** | 16/6,4 = **2,5** | 13/6,4 ≈ **2** | 10/6,4 ≈ **1,5** |
| Procjena postava / Setup estimate | Nepovoljno / Disadvantageous | Moguće / Possible | Optimalno / Optimal | Moguće / Possible | Nepovoljno / Disadvantageous | Nepovoljno/ Disadvantageous | Nepovoljno/ Disadvantageous | Nepovoljno/ Disadvantageous |

**Tab. 1 – Izračuni mogućih postava tkalačkog stana s utezima težine 320 g (prema: Mårtensson et al. 2009: tab. 2–3; izradila: M. Korić)**
Tab. 1 – Calculations of possible loom setups with 320 g loom weights (according to: Mårtensson et al. 2009: Tab. 2–3; made by: M. Korić)

| Grupa 2 / Group 2 | Prosječna težina / Average weight: 225 g; Prosječna debljina / Average thickness: 5 cm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Potrebna napetost niti osnove / Required tension of warp threads | 5 g | 10 g | 15 g | 20 g | 30 g | 40 g | 50 g | 60 g |
| Broj niti osnove po utegu / Number of warp threads per loom weight | 225/5 = **45** | 225/10 = **22,5** | 225/15 = **15** | 225/20 ≈ **11** | 225/30 = **7,5** | 225/40 ≈ **6** | 225/50 = **4,5** | 225/60 ≈ **4** |
| Broj niti osnove po 2 reda utega / Number of warp threads per 2 rows of loom weights | 45 x 2 = **90** | 22,5 x 2 = **45** | 15 x 2 = **30** | 11 x 2 = **22** | 7,5 x 2 = **15** | 6 x 2 = **12** | 4,5 x 2 = **9** | 4 x 2 = **8** |
| Broj niti osnove po $cm^2$ / Number of warp threads per $cm^2$ | 90/5 = **18** | 45/5 = **9** | 30/5 = **6** | 22/5 ≈ **4,5** | 15/5 = **3** | 12/5 ≈ **2,5** | 9/5 ≈ **2** | 8/5 ≈ **1,5** |
| Procjena postava / Setup estimate | Nepovoljno / Disadvantageous | Optimalno / Optimal | Moguće / Possible | Nepovoljno / Disadvantageous | Nepovoljno / Disadvantageous | Nepovoljno / Disadvantageous | Nepovoljno / Disadvantageous | Nepovoljno / Disadvantageous |

Tab. 2 – Izračuni mogućih postava tkalačkog stana s utezima težine 225 g (prema: Mårtensson et al. 2009: tab. 2–3; izradila: M. Korić)
Tab. 2 – Calculations of possible loom setups with 225 g loom weights (according to: Mårtensson et al. 2009: Tab. 2–3; made by: M. Korić)

**male varijacije u težinama utega. Moguće je kako se radi o više necjelovitih setova za tkalački stan, no većina otkrivenih utega mogla je biti korištena zajedno. Utezi ne moraju nužno biti ujednačnog oblika da bi se koristili u istom postavu tkalačkog stana, a težine mogu varirati od nekoliko desetaka pa i do stotina grama, te se mogu kompenzirati s više ili manje niti osnove po utegu, ovisno o težini pojedinačnog utega (Barber 1991: 96; Cahill 2002: 179; Sekelj Ivančan, Karavidović 2016: 199–201). Naime, gotovo svi cjelovito sačuvani utezi iz Vukovarske 2 teže između 194,2 i 341,9 g, dok iznimku čini jedan veći konični uteg težine 386,9 g, i nekolicina lakših: konični uteg težine 140,7 g, diskoidni utezi prosječne težine od 170 g, te trapezoidni uteg težine od 76,3 g.**

**Prema dosadašnjim istraživanjima i eksperimentima, može se generalno zaključiti kako su lakši utezi korišteni za tkanje s tanjim nitima, dok se teži utezi koriste za deblje niti (Mårtensson et al. 2009: 378; Andersson Strand 2012: 211; Olofsson et al. 2015: 95). Nije moguće odrediti precizne mjere tanjih i**

of the loom weights constituted a complete set for the loom, particularly given the small variations in their weights. It is possible that multiple incomplete sets were present; however, most of the discovered loom weights may have been used in conjunction. The loom weights do not need to be of identical shape to function together on a loom, and variations of several tens, or even hundreds of grams can be accommodated by adjusting the number of warp threads per loom weight, depending on the specific weight of each piece (Barber 1991: 96; Cahill 2002: 179; Sekelj Ivančan, Karavidović 2016: 199–201). Nearly all the completely preserved loom weights from Vukovarska 2 fall within the range of 194.2 to 341.9 g, with exceptions including one larger conical loom weight at 386.9 g and a few lighter ones: a conical loom weight of 140.7 g, discoid loom weights averaging 170 g, and a trapezoidal loom weight of 76.3 g.

Previous studies and experiments suggest that finer warp threads were used with lighter loom weights, while thicker threads were paired with heavier ones (Mårtensson et al. 2009: 378; Andersson Strand 2012: 211; Olofs-

**debljih niti, s obzirom na činjenicu da se radi o organskom materijalu koji je vrlo rijetko sačuvan u arheološkom kontekstu, ali i materijalu koji je vrlo elastičan, te je njegov promjer promjenjiv kroz vrijeme i upotrebu (Andersson Strand 2012: 209–212). Prosječna debljina niti može se približno izračunati prema potrebnoj napetosti, te tako niti koje zahtjevaju 10 g napetosti mogu biti promjera manjeg od 0,3 mm, dok su niti koje zahtjevaju 15–20 g napetosti promjera između 0,3 i 0,4 mm (Mårtensson et al. 2009: 378). Ipak, različite vrste niti, odnosno materijala, zahtijevaju različite razine napetosti, te su se navedeni utezi mogli koristiti za izradu šireg spektra tkanina. No, iz trenutno dostupnih podataka, moguće je pretpostaviti kako je prva grupa piramidalnih i koničnih utega mogla biti korištena prilikom izrade otvorenije tkanine s debljim nitima (sa 6–7 niti po cm$^2$), dok je manja grupa piramidalnih utega mogla biti korištena za izradu nešto gušće tkanine s 9 niti po cm$^2$. Dva diskoidna utega prosječne težine od 170 g, mogla su biti korištena za izradu relativno guste tkanine s 11–12 niti po cm$^2$, dok trapezoidni uteg težine od 76,3 g sugerira mogućnost izrade tkanine s vrlo tankim nitima.**

**Važno je napomenuti kako se na ovaj način može izračunati samo količina niti osnove te su sve pretpostavke izvedene iz tog podatka, no, količina niti potke ima jednak utjecaj na izgled finalnog proizvoda. Ako se radi o istoj količini niti potke i osnove, dobit će se ujednačeno jednostavno tkanje, dok se većim brojem jednih ili drugih niti dobije potkino ili osnovino lice tkanine (Mårtensson et al. 2009: 376, Figs. 3–6).**

**Postavlja se pitanje na koji su se način niti osnove pričvršćivale na utege, odnosno da li su vezivane direktno na uteg ili posredno preko nekog pomagala. Direktno vezivanje niti na uteg nije vjerojatno, prvenstveno zbog malog promjera perforacija koje bi znatno otežalo i odužilo proces (Sekelj Ivančan, Karavidović 2016: 194–195). Pojedini sačuvani ikonografski prikazi ali i artefakti pokazuju kako su u tu svrhu mogli biti korišteni metalni koluti (Davidson, Thompson 1975: 68, Fig. 30; Barber 1991: 104). S obzirom da utezi iz Vukovarske 2 ne pokazuju jasne tragove korištenja oko perforacija, niti ostatke metala unutar njih, postoji mogućnost kako su korištene vrpčane petlje na koje bi se potom pričvrstile niti osnove (Sekelj Ivančan, Karavidović 2016: 195; Ferrara, Meo 2017: 122).**

son et al. 2015: 95). Although measuring the precise diameter of the warp threads is difficult due to their organic nature and tendency to degrade in archaeological contexts, their tension requirements can provide a rough estimate (Andersson Strand 2012: 209–212). Threads requiring a tension of 10 g are likely less than 0.3 mm in diameter, while those needing 15–20 g range from 0.3 to 0.4 mm in diameter (Mårtensson et al. 2009: 378). Different materials, however, require different levels of tension, indicating that these loom weights could have been used to create a variety of fabrics. Based on the available data, it is possible that the first group of pyramidal and conical loom weights was used to produce open-faced fabrics with thicker threads (6–7 threads per cm$^2$), while the smaller group of pyramidal loom weights may have been used for denser fabrics with 9 threads per cm$^2$. Two discoid loom weights, averaging 170 g, might have been used to produce a dense fabric with 11–12 threads per cm$^2$, while a light trapezoidal loom weight of 76.3 g suggests the possibility of making fabric with very thin threads.

It is important to note that these calculations are based solely on the warp threads, while the appearance of the final fabric also depends on the number of weft threads. If the number of warp and weft threads is equal, a balanced tabby weave is produced. If one type outnumbers the other, the result will be either a weft-faced or warp-faced fabric (Mårtensson et al. 2009: 376, Figs. 3–6).

The question arises regarding how the warp threads were attached to the loom weights – specifically, whether they were tied directly to the loom weights or indirectly through some form of aid. Directly tying the threads to the loom weights seems unlikely due to the small diameter of the perforations, which would complicate and prolong the process (Sekelj Ivančan, Karavidović 2016: 194–195). Some preserved iconographic representations and artifacts suggest that metal rings may have been utilized for this purpose (Davidson, Thompson 1975: 68, fig. 30; Barber 1991: 104). Since the loom weights from Vukovarska 2 display no clear signs of use wear around the perforations and show no metal remnants within them, it is plausible that cord loops were used, to which the warp threads would then be attached (Sekelj Ivančan, Karavidović 2016: 195; Ferrara, Meo 2017: 122)

## Oznake na utezima

**Gotovo tri četvrtine utega iz Vukovarske 2, odnosno 73 %, sadrži na sebi neku vrstu oznake. Oznake na utezima mogu se podijeliti na temelju načina njihovog izvođenja u dvije kategorije: utiskivanje gema i urezivanje simbola ili slova. Najveća količina utega, njih čak 30, sadrži oznake izvedene utiskivanjem gema s prikazima, dok je urezivanje zastupljeno na 5 utega.**

**Identičan otisak geme vidljiv je na 16 piramidalnih (T. 1–2; 3: 1–3, 6) i 8 koničnih utega (T. 5: 1–8). Otisak ovalnog oblika nalazi se na gornjoj površini, dimenzija je 14 x 11 mm s prikazom hipokampa, konja iz grčke mitologije kojemu donji dio tijela čini riblji rep (sl. 4: 1).**

**Osim navedenih, otkrivena je još nekolicina nalaza utega s različitim otiscima gema. Trapezoidni uteg (T. 7: 2) sadrži pet identičnih otisaka: na bočnim stranama se nalaze četiri otiska (na dvije strane po jedan otisak, a na jednoj strani dva) te još jedan uništeni otisak na dnu utega. Radi se o romboidnom otisku dimenzija 11 x 4 mm, s prikazom zvijezde sa šest krakova (sl. 4: 2). Konični uteg (T. 6: 4) sadrži dva ovalna otiska gema: na vrhu se nalazi prikaz ženske figure unutar otiska dimenzija 7 x 9 mm, uz koji je sačuvan i djelomični otisak prsta, dok se sa strane nalazi prikaz figure s podignutom rukom unutar otiska dimenzija 20 x 13 mm (sl. 4: 3). Konični uteg (T. 6: 5) sadrži također dva otiska, jedan prikazuje glavu bika dok je drugi prikaz teže interpretirati, no moguće je kako se također radi o životinjskoj glavi (sl. 4: 4). Otiske gema sadrže još dva konična (T. 6: 2, 7) i jedan piramidalni uteg (sl. 4: 5; T. 4: 3), no zbog istrošenosti nije moguće interpretirati njihove prikaze.**

**Samo pet utega na sebi nosi urezane oznake. Tri piramidalna utega (T. 4: 4–6) sadrže urezanu tanku liniju na gornjem dijelu, dužine 9–12 mm, a širine 1–2 mm, dok konični uteg (T. 6: 6) na vrhu sadrži urezani simbol „+“, čije su linije dužine 18–20 mm, te širine 3–6 mm, dok je dubina ureza 3,5 mm. Izdvaja se trapezoidni uteg (T. 7: 1; sl. 5: 1) koji pri dnu ispod perforacija, sadrži urezana slova „BA“ visine 11 a širine 16 mm.**

**Označavanje utega poznato je u različitim kulturnim kontekstima, no sama uloga oznaka još je uvijek predmet rasprave. Oznake se izvode utiskivanjem različitih predmeta, primjerice gema ili komada nakita i nošnje, ali i urezivanjem simbola, slova ili riječi (Davidson, Thompson**

## Markings on loom weights

Almost three-quarters (73%) of the loom weights from Vukovarska 2 bear some form of marking. These markings fall into two categories based on their method of execution: gem impressions and engraved symbols or letters. The majority, totalling 30 loom weights, feature markings created by impressing gems, while engravings are present on 5 loom weights.

An identical gem impression is visible on 16 pyramidal (T. 1–2; 3: 1–3, 6) and 8 conical loom weights (T. 5: 1–8). The oval-shaped impressions, measuring 14x11 mm, are located on the upper surface and depict a hippocampus – a mythical creature from Greek mythology with the upper body of a horse and the lower body of a fish tail (Fig. 4: 1).

Several other loom weights with distinct gem impressions were found. For instance, a trapezoidal loom weight (Pl. 7: 2) has five identical rhomboid impressions, each measuring 11x4 mm, with a six-pointed star motif (Fig. 4: 2). Four of the impressions are located on the sides, while one damaged impression is on the bottom. Another conical loom weight (Pl. 6: 4) features two oval impressions: one on top, depicting a female figure measuring 7x9 mm along with a preserved partial fingerprint, and another on the side, showing a figure with a raised hand, measuring 20x13 mm (Fig. 4: 3). A different conical loom weight (Pl. 6: 5) has two impressions: one depicting a bull's head and the other featuring an unclear design, which may also represent an animal head (Fig. 4: 4). Two additional conical loom weights (Pl. 6: 2, 7) and one pyramidal loom weight (Fig. 4: 5; Pl. 4: 3) have gem impressions that are too worn to interpret.

In contrast, only five loom weights exhibit engraved markings. The pyramidal loom weights (Pl. 4: 4–6) feature a thin, incised line on their top surfaces, measuring 9–12 mm in length and 1–2 mm in width. One conical loom weight (Pl. 6: 6) displays an engraved "+" symbol with lines measuring 18–20 mm in length and 3–6 mm in width, with an incision depth of 3.5 mm. Particularly notable is a trapezoidal loom weight (Pl. 7: 1; fig. 5: 1) that bears the engraved letters "BA" below its perforations. The letters are 11 mm high and 16 mm wide.

The presence of loom weight markings is documented across various cultural contexts, but their purpose remains debated. Markings are made by impressing various objects, such as gems or pieces of jewellery, as well as by engraving symbols, letters, or words (David-


Sl. 4 – Otisci gema na keramičkim utezima iz Vukovarske 2 (snimila i nacrtala: M. Korić)
Fig. 4 – Gem impressions on ceramic loom weights from Vukovarska 2 (photo and drawing by: M. Korić)

**1975: 74–75; Popović, Vranić 2006: 315; Gleba 2008: 262; Antolini, Marengo 2012; Rahmstorf 2015: 7). Postoje različite interpretacije oznaka ovisno o njihovom karakteru, kao primjerice da se radi o oznakama vlasnika utega ili radionice koja ih je proizvela, ali i radionice za proizvodnju tekstila (Davidson, Thompson 1975: 75; Kirigin 2004: 169; Gleba 2008: 137; Márton et al. 2008: 9–10), ili oznakama seta utega (Márton et al. 2008: 10). Isto tako, moguće je da se u nekim slučajevima radi o oznakama težina utega (Davidson 1952: 152; Márton et al. 2008: 10; Spantidaki 2016: 66; Fileš Kramberger 2021: 164) ili redoslijeda utega na tkalačkom stanu, odnosno oznakama uzorka tkanine (Belanová-Štolcová, Gromer 2010: 16; Sekelj Ivančan, Karavidović 2016: 188–189, 202–203; Spantidaki 2016: 66; Fileš Kramberger 2021: 165). Također, moguće je da su pojedine oznake imale simboličku, odnosno ritualnu ulogu (Brøns, Nosch 2017; Miszk 2012: 124; Fileš Kramberger 2021: 159–160). Ne postoji jedinstvena interpretacija koja bi objasnila široki spektar oznaka na utezima, te je izvjesno kako su oznake imale različita značenja ovisno o kulturnom i vremenskom kontekstu (Spantidaki 2016: 66).**

**Posebno je zanimljiv trapezoidni uteg iz Vukovarske 2 s natpisom „BA" (sl. 5: 1; T. 7: 1), kojemu se ne može odrediti precizno značenje oznake, no neke od mogućnosti su da pojedinačna slova predstavljaju skraćene nazive ili imena (Baldwin Bowski, Gavrilaki 2010: 188; Korić, Ugarković 2023), ili su oznake grupacija**

son, Thompson 1975: 74–75; Popović, Vranić 2006: 315; Gleba 2008: 262; Antolini, Marengo 2012; Rahmstorf 2015: 7). Some theories suggest that these markings indicated the owner, the workshop that produced the loom weights, or even a textile production workshop (Davidson, Thompson 1975: 75; Kirigin 2004: 169; Gleba 2008: 137; Márton et al. 2008: 9–10), as well as a loom weight set (Márton et al. 2008: 10). Others propose that they denoted individual weight measurements (Davidson 1952: 152; Márton et al. 2008: 10; Spantidaki 2016: 66; Fileš Kramberger 2021: 164), or indicated their position on the loom as fabric sample markers (Belanová-Štolcová, Gromer 2010: 16; Sekelj Ivančan, Karavidović 2016: 188–189, 202–203; Spantidaki 2016: 66; Fileš Kramberger 2021: 165). Also, it is possible that certain markings had a symbolic or ritual role (Brøns, Nosch 2017; Miszk 2012: 124; Fileš Kramberger 2021: 159–160). The diversity of interpretations reflects the varying cultural and temporal contexts in which these markings were used (Spantidaki 2016: 66).

The trapezoidal loom weight from Vukovarska 2, marked with "BA" (Fig. 5: 1; Pl. 7: 1), is particularly intriguing, though its exact meaning remains uncertain. The letters may represent abbreviated names or titles (Baldwin Bowski, Gavrilaki 2010: 188; Korić, Ugarković 2023) or could indicate groups of threads on the loom (La Rosa, Portale 2000: 345). Interestingly, an identical inscription

**niti na tkalačkom stanu (La Rosa, Portale 2000: 345). Navedeni uteg ima direktne analogije na nalazištu Remete vrt u Starome Gradu (sl. 5: 2), gdje je otkriven trapezoidni uteg s identičnim natpisom, te se može pretpostaviti da je natpis izvela ista osoba, odnosno da utezi pripadaju istoj radionici ili istom vlasniku. Uteg s Remete vrta neznatno je većih dimenzija i težine, a razliku čini i što se njegov natpis nalazi neposredno ispod perforacija.**

**U slučaju otiska geme s prikazom hipokampa, postoji mogućnost kako se radi o oznaci seta utega posebno kada se uzme u obzir činjenica da su svi primjerci s navedenom oznakom podudarajućih dimenzija i težina. S druge strane, od pet piramidalnih utega uniformnih dimenzija i težina, samo tri su označena urezanom linijom na gornjoj površini, te je teško pretpostaviti svrhu oznake. Moguće je da se radi o oznaci seta utega, s obzirom da nije nužno da je svaki pojedini uteg označen (Márton et al. 2008: 10), no isto tako se može raditi o oznaci pozicije utega na tkalačkom stanu ili uzorkama tkanine, ali i o nekoj sasvim drugoj oznaci. Bez točnih podataka o poziciji nalaza unutar strukture i eventualnom rasporedu utega na tkalačkom stanu, nije moguće donositi konkretne zaključke.**

was found on a trapezoidal loom weight at the site of Remete Vrt in Stari Grad (Fig. 5: 2), suggesting that the same person may have inscribed both loom weights or that they originated from the same workshop or owner. The Remete Vrt loom weight is larger and heavier, with its inscription located directly below the perforations.

In the case of gem impressions depicting a hippocampus, there is a possibility that this mark signifies a set of loom weights, particularly considering that all specimens bearing this specific marking share matching dimensions and weights. Conversely, among five pyramidal loom weights of uniform dimensions and weights, only three feature an incised line on the upper surface. This marking could also indicate a set of loom weights, as it is not necessary for each individual specimen to bear a mark (Márton et al. 2008: 10). Alternatively, it might signify the arrangement of the loom weights on the loom or fabric sample markers, but they could also have an entirely different purpose. Without precise data regarding the context of the finds and the potential setup of the loom, drawing definitive conclusions is not possible.


Sl. 5 – 1 Trapezoidni uteg s natpisom „BA" iz Vukovarske ceste 2; 2 Trapezoidni uteg s natpisom „BA" iz Remete vrta (snimila i nacrtala: M. Korić)
Fig. 5 – 1 Trapezoidal loom weight with inscription from Vukovarska 2; 2 Trapezoidal loom weight with inscription from Remete vrt (photo and drawing by: M. Korić)

## Datacija i analogije

**Alat korišten za izradu tkanina čini grupu nalaza koja je često tek usputno spomenuta prilikom objava arheoloških istraživanja, a ako su i objavljeni, najčešće je to bez osnovnih parametara ključnih za njihovo proučavanje, kao što su dimenzije i težina. Keramičke utege za tkalački stan nije moguće precizno datirati na temelju tipologije zbog vrlo ujednačenih oblika koji se javljaju kroz duže razdoblje. Također, utezi različitih oblika mogu se pronaći zajedno u istom kontekstu, što dodatno otežava bilo kakve kronološke klasifikacije oblika (Sofianou 2012: 82). Trenutno jedini sigurni način datiranja utega je pomoću konteksta unutar kojeg su otkriveni, iako ne treba isključiti mogućnost korištenja takvih predmeta kroz više generacija.**

**Piramidalni i konični utezi čine vrlo rasprostranjene oblike, te se ne mogu povezati s određenim periodom i prostorom. Na području Grčke, piramidalni utezi potvrđeni su još tijekom ranog neolitika (Barber 1991: 99), a konični tijekom kasnog neolitika (Carington Smith 1977: 157, Pl. XVc). Na području Italije, piramidalni utezi su najranije zabilježeni tijekom brončanog doba, a tijekom 1. tis. pr. Kr. postaju jedan od najčešćih oblika otkrivenih na arheološkim nalazištima (Gleba 2008: 131), dok se konični utezi javljaju nešto kasnije, tijekom arhajskog perioda (Gleba 2012: 235). Diskoidni utezi se najčešće povezuju s helenističkim razdobljem iako se pojavljuju i ranije (Gleba 2008: 132 i tamo navedena literatura; Topić 2017: 177). Najraniji primjerci sličnih oblika zabilježeni su tijekom ranog brončanog doba na Kreti, te kasnije i na većem dijelu južne Egeje (Ulanowska 2019: 735; Spantidaki 2016: 65–66). Na području Italije, diskoidni utezi otkriveni su od sredine 1. tis. pr. Kr. (Gleba 2008: 252, 257), točnije, od sredine 5. st. pr. Kr na Siciliji te od kasnog 4. st. pr. Kr na području južne Italije i to najčešće u grčkim naseljima (Ferrara, Meo 2017: 123).**

**Na području Dalmacije, piramidalni i konični utezi poznati su od prapovijesti, odnosno zasigurno su u upotrebi od kasnog brončanog doba nadalje (Batović 1968: T. XXII; 1983: 316; 1987: 372; Brusić 1977: T. XVII: 1; XVIII: 2; Marović 2002: 221, 229, 259, T. XXX: 1–2), no zbog nedostatne objavljenosti ove vrste materijala nije moguće odrediti preciznu sliku njihove rasprostranjenosti kao ni početka korištenja. Navedeni oblici utega, posebno piramidalni, nastavljaju se koristiti i dolaskom Grka na područje srednje Dalmacije, te su poznati brojni primjeri iz grčkih**

## Dating and analogies

Textile tools, such as loom weights, are often only briefly mentioned in archaeological reports. When they are published, crucial details like dimensions and weight are often omitted. Ceramic loom weights are particularly difficult to date by typology due to their uniform shapes, which persisted over long periods. Additionally, different forms of loom weights can be found together in the same context, further complicating chronological classification (Sofianou 2012: 82). The only reliable method for dating loom weights is by examining the archaeological context in which they were discovered; however, it is possible that such tools were used across multiple generations.

Pyramidal and conical loom weights are widespread forms that cannot be tied to a specific period or region. In Greece, pyramidal loom weights have been identified as early as the Neolithic period (Barber 1991: 99), while conical loom weights emerged during the Late Neolithic (Carington Smith 1977: 157, Pl. XVc). In Italy, pyramidal loom weights date back to the Bronze Age and became common by the 1st millennium BC (Gleba 2008: 131), whereas conical loom weights appear slightly later in the Archaic period (Gleba 2012: 235). Discoid loom weights are most frequently associated with the Hellenistic period, although they also appear earlier (Gleba 2008: 132 and the cited literature; Topić 2017: 177). Early examples of discoid shapes have been found from the Early Bronze Age in Crete and later throughout most of the southern Aegean (Ulanowska 2019: 735; Spantidaki 2016: 65–66). In Italy, discoid loom weights are present from the mid-1st millennium BC (Gleba 2008: 252, 257), specifically from the middle of the 5th century BC in Sicily and from the late 4th century BC in southern Italy, most often in Greek settlements (Ferrara, Meo 2017: 123).

In Dalmatia, pyramidal and conical loom weights have been used since prehistoric times, certainly as early as the Late Bronze Age (Batović 1968: Pl. XXII; 1983: 316; 1987: 372; Brusić 1977: Pl. XVII: 1; XVIII: 2; Marović 2002: 221, 229, 259, T. XXX: 1–2). However, due to the limited publication of this material, the precise distribution and onset of their use remains unclear. These loom weights, especially the pyramidal ones, continued to be used even after the arrival of the Greeks in central Dalmatia, with numerous examples found in Greek cities and affiliated settlements such as Pharos

**gradova i povezanih naselja kao što su Far (Migotti 1986: 167, T. 4: 10–11; Kirigin, Hayes, Leach 2002: 249, Pl. VI: B1–2; Kirigin 2004: 169, T. 35: B1–2; Čače et al. 2022: HV 10, 13–14; Ugarković et al. 2023: sl. 4: 1–6, 8), Isa (Čargo 2021: 84, kat. br. 99–100; Kirigin 2008: kat. br. 85), Narona (Topić 2017: 177–178, T. 12: 114) i Sikuli (Šuta 2011: 92, inv. br. 3756). Prema trenutno dostupnoj literaturi, čini se kako su konični utezi tijekom razdoblja helenizma zastupljeni samo u Faru (osobni uvid u materijal; Migotti 1986: 167, T. 4: 11; Kirigin, Hayes, Leach 2002: 249; Kirigin 2004: 169), no nije moguće utvrditi da li je to stvarna slika rasprostranjenosti ili se radi o nepotpunoj objavljenosti materijala s drugih lokaliteta. S druge strane, prema dosadašnjem stanju istraženosti, diskoidni utezi se na području Dalmacije javljaju tek u kontekstu grčkog utjecaja te je najveća količina takvih utega poznata iz spomenutih grčkih gradova i povezanih naselja (Migotti 1986: 167, T. 4: 9, 13; Kirigin 1986: kat. br. 161–162; 2004: 169; 2008: kat. br. 84, 86; Jeličić Radonić 1995: 103, 112, 114, kat. br. 58; Šuta 2011: 91–94; Topić 2017: 177–178, sl. 25, T. 24: 239; Ugarković 2019a: 145, sl. 186; 2019b: kat. br. 38.6, 142a.17; Čargo 2021: kat. br. 90–98; Čače et al. 2022: HV 15; Ugarković et al. 2022: T. 3: 40; 2023: sl. 4: 9; Korić, Ugarković 2023).**

**Pojedini objavljeni primjerci grčkih utega iz Fara datirani su u širi vremenski raspon od 4. do 2./1. st. pr. Kr. (Migotti 1986: 167; Ugarković et al 2023: sl. 4, tab. 3), dok su temeljem konteksta uže datirani u kraj 4. i početak 3. st. pr. Kr. diskoidni utezi s nalazišta na trgu Sv. Stjepana (Korić, Ugarković 2023: 72–73) i na tzv. parceli Lupi u Ulici Ivana Pavla II (Ugarković et al. 2022: 39, T. 3: 40). Tome odgovaraju i utezi iz Vukovarske 2, koji se na temelju konteksta također mogu datirati u kraj 4., odnosno početak 3. st. pr. Kr. (Jeličić Radonić 1995: 103). Spomenuti nalazi piramidalnih i diskoidnih utega iz Narone, Sikula i Ise datiraju se uglavnom u 2. ili 1. st. pr. Kr. (Šuta 2011: 92, 94; Topić 2017: 177–178, T. 12: 114; Ugarković 2019b: 38.6, 142a.18), osim pojedinih primjeraka iz Ise koji se datiraju u širi period od 3. do 1. st. pr. Kr. (Kirigin 1986: kat. br. 161–162) ili generalno u razdoblje helenizma (Čargo 2021: kat. br. 90–98).**

**U kontekstu grčkog naseljavanja srednje Dalmacije, ali i ranije, trenutno nema poznatih i objavljenih primjera *in situ* tkalačkih stanova, koji bi upućivali na stupanj specijalizacije tkalačkog zanata, kao što je to slučaj na nekim drugim područjima. Primjerice, na nalazištu Vardarski Rid u blizini Gevgelije, pronađeno je preko 150** (Migotti 1986: 167, Pl. 4: 10–11; Kirigin, Hayes, Leach 2002: 249, Pl. VI: B1–2; Kirigin 2004: 169, Pl. 35: B1–2; Čače et al. 2022: HV 10, 13–14; Ugarković et al. 2023: Fig. 4: 1–6, 8), Issa (Čargo 2021: 84, cat. no. 99–100; Kirigin 2008: cat. no. 85), Narona (Topić 2017: 177–178, Pl. 12: 114), and Siculi (Šuta 2011: 92, inv. no. 3756). According to the currently published material, it seems that conical loom weights during the Hellenistic period are represented only in Pharos (personal inspection of the material; Migotti 1986: 167, Pl. 4: 11; Kirigin, Hayes, Leach 2002: 249; Kirigin 2004: 169), but the lack of complete publications from other sites may obscure a broader distribution. Conversely, discoid loom weights in Dalmatia appear only in Greek-influenced contexts, with the greatest concentration found in Greek cities and affiliated settlements (Migotti 1986: 167, Pl. 4: 9, 13; Kirigin 1986: cat. no. 161–162; 2004: 169; 2008: cat. no. 84, 86; Jeličić Radonić 1995: 103, 112, 114, cat. no. 58; Šuta 2011: 91–94; Topić 2017: 177–178, Fig. 25, Pl. 24: 239; Ugarković 2019a: 145, Fig. 186; 2019b: cat. no. 38.6, 142a.17; Čargo 2021: cat. no. 90–98; Čače et al. 2022: HV 15; Ugarković et al. 2022: Pl. 3: 40; 2023: Fig. 4: 9; Korić, Ugarković 2023).

Certain published examples of Greek loom weights from Pharos suggest a broader time span, ranging from the 4th to the 2nd/1st century BC (Migotti 1986: 167; Ugarković et al. 2023: Fig. 4, Tab. 3). However, based on their context, discoid weights found at St. Stjepan Square (Korić, Ugarković 2023: 72–73) and at the so-called Lupi plot on Ivana Pavla II Street (Ugarković et al. 2022: 39, Pl. 3: 40) are more accurately dated to the late 4th century and the early 3rd century BC, corresponding with the loom weights from Vukovarska 2 (Jeličić Radonić 1995: 103). Other pyramidal and discoid loom weights from Narona, Siculi, and Issa are primarily dated to the 2nd or 1st centuries BC (Šuta 2011: 92, 94; Topić 2017: 177–178, Pl. 12: 114; Ugarković 2019b: 38.6, 142a.18), with some examples from Issa dated as broadly as the 3rd to the 1st centuries BC (Kirigin 1986: cat. no. 161–162), or generally to the Hellenistic period (Čargo 2021: cat. no. 90–98).

In the context of the Greek settlement of central Dalmatia, as well as earlier periods, there are currently no known or published examples of *in situ* looms. Such finds would provide insights into the degree of specialization in weaving, as observed in other regions. For instance, a single room at the Vardarski Rid site near Gevgelija contained over 150 *in situ* ceramic loom weights, believed to have

***in situ*** **keramičkih utega za tkalački stan unutar jedne prostorije, za koju se smatra da je uništena u požaru krajem 4. st. pr. Kr. (Mitrevski 2005: 58–62, Fig. 55). Također, na nalazištu Kale u Krševici, pronađeno je preko 1000 utega za tkalački stan koji se mogu datirati u 4. i početak 3. st. pr. Kr., no, nalazi su većinom iz sekundarnog konteksta (Popović, Vranić 2006). Na području Trakije (Dimova 2016), te posebno na području Grčke (Barber 1991: 102, 387–390; Burke 1997: 417; Richmond 2006: 209–210; Andersson Strand, Nosch 2015) nalazi ostataka tkalačkih stanova iz brončanog i željeznog doba su znatno brojniji te omogućuju detaljne rasprave o tekstilnoj proizvodnji. No, zbog nedostatka bližih analogija, trenutno nije moguće donositi konkretne zaključke o organizaciji i stupnju specijalizacije tkalačkog zanata kao ni o opsegu proizvodnje tekstila na području srednje Dalmacije.**

## ZAKLJUČAK

**Tijekom zaštitnih istraživanja na poziciji Vukovarska 2 u Starome Gradu na otoku Hvaru, prikupljeno je 48 keramičkih utega za tkalačkih stan različitih dimenzija i oblika. Najbrojniji su piramidalni, slijede konični, dok su trapezoidni i diskoidni utezi zastupljeni s po dva primjerka. Zanimljivo je da je čak 73 % utega sadrži neku vrstu oznake, izvedenu utiskivanjem gema i urezivanjem simbola ili slova.**

**Gotovo svi cjelovito sačuvani utezi teže između 194,2 i 341,9 g, dok iznimku čini jedan veći uteg težine 386,9 g, i nekolicina lakših utega težina između 76,3 i 173,4 g. Na temelju podudarajućih dimenzija, odnosno težina i debljina utega, mogu se uočiti pojedine grupacije. Posebno je zanimljivo 17 piramidalnih i 10 koničnih utega prosječne težine 320 g, od kojih su gotovo svi označeni otiskom geme s prikazom hipokampa. Osim toga, izdvaja se pet piramidalnih utega uniformnih oblika i dimenzija, prosječne težine 225 g. Generalno se može zaključiti kako su utezi iz Vukovarske 2 korišteni za izradu tkanina različitih karaktera, od onih relativno otvorenijih sa 6–7 niti osnove po cm², do gustih tkanja sa čak 11–12 niti po cm², a široki raspon težina utega upućuje na korištenje i tanjih i debljih niti za proizvodnju tkanina.**

**Temeljem dostupnih podataka o istraživanjima na poziciji Vukovarska 2, nije moguće precizno interpretirati kontekst nalaza utega za tkalački stan. Nalazi keramičkih posuda, pitosa te luterija upućuju na mogućnost da se radi o ku-**

been destroyed by fire at the end of the 4th century BC (Mitrevski 2005: 58–62, Fig. 55). Similarly, the Kale site in Krševica yielded over 1000 loom weights, dated to the 4th and early 3rd centuries BC; however, most of these were found in secondary contexts (Popović, Vranić 2006). In contrast, the remains of Bronze and Iron Age looms are significantly more numerous in regions such as Thrace (Dimova 2016) and Greece (Barber 1991: 102, 387–390; Burke 1997: 417; Richmond 2006: 209–210; Andersson Strand, Nosch 2015), enabling detailed studies of textile production in those areas. Due to the lack of closer analogies, however, it is currently not possible to draw definitive conclusions about the organization, degree of specialization, or scale of textile production in central Dalmatia.

## CONCLUSION

During rescue excavations at the Vukovarska 2 site in Stari Grad on the island of Hvar, 48 ceramic loom weights of various shapes and sizes were discovered. Pyramidal weights are the most common, followed by conical, while trapezoidal and discoidal loom weights are represented by two specimens each. Notably, 73% of the loom weights bear markings, including gem impressions and engraved symbols or letters.

Nearly all completely preserved loom weights weigh between 194.2 g and 341.9 g, with one larger example weighing 386.9 g and a few lighter ones ranging from 76.3 g to 173.4 g. Groups of loom weights with similar dimensions, thickness, and weights can be identified. Particularly striking are 17 pyramidal and 10 conical loom weights, averaging 320 g, most of which feature gem impressions depicting hippocampus. Additionally, five pyramidal loom weights exhibit uniform shapes and dimensions, with an average weight of 225 g. The evidence suggests that the loom weights from Vukovarska 2 were used to produce textiles of varying types, ranging from relatively open-faced fabrics with 6–7 warp threads per cm² to denser fabrics with up to 11–12 threads per cm². The broad range of their weights indicates the use of threads of differing thicknesses.

However, based on the available excavation data from the site of Vukovarska 2, the context in which these loom weights were discovered remains unclear. The accompanying finds of ceramic vessels, a pithos, and a louterion suggest that the site might have been a household rather than a specialized textile workshop. However, this

**ćanstvu, a ne o specijaliziranoj radionici iako se to ne može sa sigurnošću tvrditi zbog nedostatka analogija u grčkim gradovima i povezanim naseljima na području srednje Dalmacije. Do sada nije objavljen niti jedan cjeloviti nalaz seta utega za tkalački stan s ovog područja koji bi upućivao na stupanj specijalizacije tkalačkog zanata.**

**Analiza utega iz Vukovarske 2 trenutno je izolirani primjer tkalačkog zanata i vrsta tkanina koje su mogle biti proizvedene u grčkom gradu Faru krajem 4. odnosno početkom 3. st. pr. Kr., te time omogućuju sagledavanje rane faze razvoja zanata. Prema trenutno dostupnoj i objavljenoj literaturi, čini se kako su upravo u Faru otkriveni najstariji tragovi tkalačkog zanata unutar konteksta grčkog naseljavanja srednje Dalmacije. No, od iznimne je važnosti objava svakog skupa nalaza zajedno sa svim bitnim parametrima, kako bi se omogućila daljnja istraživanja koja bi pružila cjelovitu sliku. Ipak, važno je napomenuti kako je Far jedini grčki grad na području Dalmacije koji nam pruža mogućnost da u naseobinskom sloju sagledamo aspekte razvoja ovoga zanata, što će se svakako potvrditi i budućim istraživanjima.**

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interpretation is speculative due to a lack of direct analogies in other Greek cities and affiliated settlements in central Dalmatia. To date, no complete set of loom weights from this area has been published that could definitively point to the level of specialization in weaving during this period.

The analysis of loom weights from Vukovarska 2 currently serves as an isolated illustration of the weaving craft and the types of fabrics that may have been produced in the Greek city of Pharos during the late 4th or early 3rd century BC, providing a glimpse into the early stages of craft development. According to existing publications, Pharos contains the earliest evidence of the weaving craft within the context of the Greek settlement of central Dalmatia. It is essential to publish each assemblage along with all relevant parameters to facilitate further research that can offer comprehensive understanding. Furthermore, it is noteworthy that Pharos is the only Greek city in Dalmatia that allows exploration of aspects of this craft's development within its settlement layers, a fact likely to be corroborated by future research.

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**INTERNETSKI IZVOR** INTERNET SOURCE

**Geoportal DGU** – Geoportal, Državna geodetska uprava / State Geodetic Adiminstration (SGA), https://geoportal.dgu.hr/

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## **Katalog** Catalogue

**Kratice /** Abbreviations**: V – visina (height); V/S – sačuvana visina (preserved height); ŠD – širina dna (bottom width); ŠV – širina vrha (top width); DD – debljina dna (bottom thickness); DV – debljina vrha (top thickness); PD – promjer dna (bottom diameter); PV – promjer vrha (top diameter); PP – promjer perforacije (perforation diameter); T – težina (weight); T/S – sačuvana težina (preserved weight)**

**T. 1: 1 – piramidalni uteg / pyramidal loom weight (SG9017), V: 90 mm, ŠD: 61 mm, DD: 64 mm, ŠV: 25 mm, DV: 24 mm PP: 5 mm, T: 309,1 g.**

**T. 1: 2 – piramidalni uteg / pyramidal loom weight (SG9018), V: 90 mm, ŠD: 63 mm, DD: 64 mm, ŠV: 24 mm, DV: 23 mm PP: 5 mm, T: 315,2 g.**

**T. 1: 3 – piramidalni uteg / pyramidal loom weight (SG9019), V: 90 mm, ŠD: 60 mm, DD: 65 mm, ŠV: 25 mm, DV: 26 mm PP: 6 mm, T: 325,8 g.**

**T. 1: 4 – piramidalni uteg / pyramidal loom weight (SG9020), V: 90 mm, ŠD: 60 mm, DD: 65 mm, ŠV: 24 mm, DV: 23 mm PP: 6 mm, T: 322,2 g.**

**T. 1: 5 – piramidalni uteg / pyramidal loom weight (SG9021), V: 89 mm, ŠD: 60 mm, DD: 63 mm, ŠV: 26 mm, DV: 26 mm PP: 6 mm, T: 337,3 g.**

**T. 1: 6 – piramidalni uteg / pyramidal loom weight (SG9022), V: 90 mm, ŠD: 60 mm, DD: 64 mm, ŠV: 24 mm, DV: 23 mm PP: 6 mm, T: 311,4 g.**

**T. 2: 1 – piramidalni uteg / pyramidal loom weight (SG9023), V: 91 mm, ŠD: 63 mm, DD: 61 mm, ŠV: 27 mm, DV: 27 mm PP: 7 mm, T: 320,3 g.**

**T. 2: 2 – piramidalni uteg / pyramidal loom weight (SG9024), V: 91 mm, ŠD: 58 mm, DD: 56 mm, ŠV: 25 mm, DV: 28 mm PP: 6 mm, T: 280,1 g.**

**T. 2: 3 – piramidalni uteg / pyramidal loom weight (SG9025), V: 91 mm, ŠD: 60 mm, DD: 58 mm, ŠV: 28 mm, DV: 28 mm PP: 5 mm, T: 304,8 g.**

**T. 2: 4 – piramidalni uteg / pyramidal loom weight (SG9026), V: 89 mm, ŠD: 62 mm, DD: 61 mm, ŠV: 23 mm, DV: 27 mm PP: 5 mm, T: 304,9 g.**

**T. 2: 5 – piramidalni uteg / pyramidal loom weight (SG9027), V: 91 mm, ŠD: 55 mm, DD: 61 mm, ŠV: 27 mm, DV: 27 mm PP: 5 mm, T: 318,7 g.**

**T. 2: 6 – piramidalni uteg / pyramidal loom weight (SG9028), V: 89 mm, ŠD: 56 mm, DD: 59 mm, ŠV: 23 mm, DV: 29 mm PP: 5 mm, T: 283,5 g.**

**T. 3: 1 – piramidalni uteg / pyramidal loom weight (SG9029), V: 91 mm, ŠD: 57 mm, DD: 62 mm, ŠV: 26 mm, DV: 27 mm PP: 5 mm, T: 326,4 g.**

**T. 3: 2 – piramidalni uteg / pyramidal loom weight (SG9030), V: 91 mm, ŠD: 60 mm, DD: 58 mm, ŠV: 25 mm, DV: 27 mm PP: 5 mm, T: 319,7 g.**

**T. 3: 3 – piramidalni uteg / pyramidal loom weight (SG9031), V: 91 mm, ŠD: 60 mm, DD: 58 mm, ŠV: 24 mm, DV: 29 mm PP: 5 mm, T: 331,7 g.**

**T. 3: 4 – piramidalni uteg / pyramidal loom weight (SG9055), V: 90 mm, ŠD: 59 mm, DD: 60 mm, ŠV: 28 mm, DV: 28 mm PP: 5 mm, T: 324,7 g.**

**T. 3: 5 – piramidalni uteg / pyramidal loom weight (SG9056), V: 92 mm, ŠD: 59 mm, DD: 59 mm, ŠV: / mm, DV: 27 mm PP: 5 mm, T/S: 276,1 g.**

**T. 3: 6 – piramidalni uteg / pyramidal loom weight (SG9057), V: 89 mm, ŠD: 62 mm, DD: 62 mm, ŠV: 26 mm, DV: 29 mm PP: 5 mm, T: 319,3 g.**

**T. 4: 1 – piramidalni uteg / pyramidal loom weight (SG9058), V/S: 88 mm, ŠD/S: 55 mm, DD/S: 54 mm, ŠV: / mm, DV: / mm PP: 6 mm, T/S: 258,5 g.**

**T. 4: 2 – piramidalni uteg / pyramidal loom weight (SG9059), V/S: 86 mm, ŠD/S: 53 mm, DD/S: 53 mm, ŠV: / mm, DV: / mm PP: 6 mm, T/S: 222,5 g.**

**T. 4: 3 – piramidalni uteg / pyramidal loom weight (SG9060), V: 58 mm, ŠD: 35 mm, DD: 35 mm, ŠV: 18 mm, DV: 18 mm PP: 4 mm, T/S: 71,1 g.**

**T. 4: 4 – piramidalni uteg / pyramidal loom weight (SG9032), V: 98 mm, ŠD: 58 mm, DD: 53 mm, ŠV: 23 mm, DV: 11 mm PP: 6 mm, T: 225,2 g.**

T. 4: 5 – piramidalni uteg / pyramidal loom weight (SG9033), V: 96 mm, ŠD: 62 mm, DD: 47 mm, ŠV: 21 mm, DV: 13 mm PP: 5 mm, T: 216,6 g.

T. 4: 6 – piramidalni uteg / pyramidal loom weight (SG9034), V: 99 mm, ŠD: 58 mm, DD: 50 mm, ŠV: 27 mm, DV: 10 mm PP: 6 mm, T: 231,6 g.

T. 4: 7 – piramidalni uteg / pyramidal loom weight (SG9035), V: 95 mm, ŠD: 58 mm, DD: 51 mm, ŠV: 27 mm, DV: 12 mm PP: 6 mm, T: 224,9 g.

T. 4: 8 – piramidalni uteg / pyramidal loom weight (SG9036), V: 91 mm, ŠD: 62 mm, DD: 51 mm, ŠV: 26 mm, DV: 14 mm PP: 6 mm, T: 223,6 g.

T. 5: 1 – konični uteg / conical loom weight (SG9037), V: 89 mm, PD: 69 mm, PV: 24 mm, PP: 6 mm, T: 316,4 g.

T. 5: 2 – konični uteg / conical loom weight (SG9038), V: 91 mm, PD: 70 mm, PV: 25 mm, PP: 7 mm, T: 334,6 g.

T. 5: 3 – konični uteg / conical loom weight (SG9039), V: 86 mm, PD: 71 mm, PV: 25 mm, PP: 5 mm, T: 339,3 g.

T. 5: 4 – konični uteg / conical loom weight (SG9040), V: 91 mm, PD: 68 mm, PV: 27 mm, PP: 5 mm, T: 341,9 g.

T. 5: 5 – konični uteg / conical loom weight (SG9041), V: 89 mm, PD: 70 mm, PV: 24 mm, PP: 5 mm, T: 333,5 g.

T. 5: 6 – konični uteg / conical loom weight (SG9042), V: 91 mm, PD: 69 mm, PV: 25 mm, PP: 5 mm, T: 333,7 g.

T. 5: 7 – konični uteg / conical loom weight (SG9043), V: 91 mm, PD: 70 mm, PV: 24 mm, PP: 5 mm, T: 317,5 g.

T. 5: 8 – konični uteg / conical loom weight (SG9044), V: 79 mm, PD: 61 mm, PV: 22 mm, PP: 6 mm, T: 194,2 g.

T. 5: 9 – konični uteg / conical loom weight (SG9045), V: 92 mm, PD: 67 mm, PV: 25 mm, PP: 5 mm, T: 273 g.

T. 5: 10 – konični uteg / conical loom weight (SG9046), V: 93 mm, PD: 70 mm, PV: 25 mm, PP: 5 mm, T: 336,5 g.

T. 5: 11 – konični uteg / conical loom weight (SG9047), V/S: 84 mm, PD: 66 mm, PV: 25 mm, PP: 5 mm, T/S: 298,6 g.

T. 6: 1 – konični uteg / conical loom weight (SG9048), V: 76 mm, PD: 57 mm, PV: 24 mm, PP: 6 mm, T: 203,3 g.

T. 6: 2 – konični uteg / conical loom weight (SG9049), V: 72 mm, PD: 60 mm, PV: 22 mm, PP: 5 mm, T: 200,6 g.

T. 6: 3 – konični uteg / conical loom weight (SG9050), V: 94 mm, PD: 71 mm, PV: 21 mm, PP: 7 mm, T: 386,9 g.

T. 6: 4 – konični uteg / conical loom weight (SG9051), V: 97 mm, PD: 63 mm, PV: 21 mm, PP: 4 mm, T: 278,9 g.

T. 6: 5 – konični uteg / conical loom weight (SG9053), V: 90 mm, PD: 51 mm, PV: 17 mm, PP: 4 mm, T: 140,7 g.

T. 6: 6 – konični uteg / conical loom weight (SG9052), V: 87 mm, PD: 62 mm, PV: 23 mm, PP: 4 mm, T: 230,8 g.

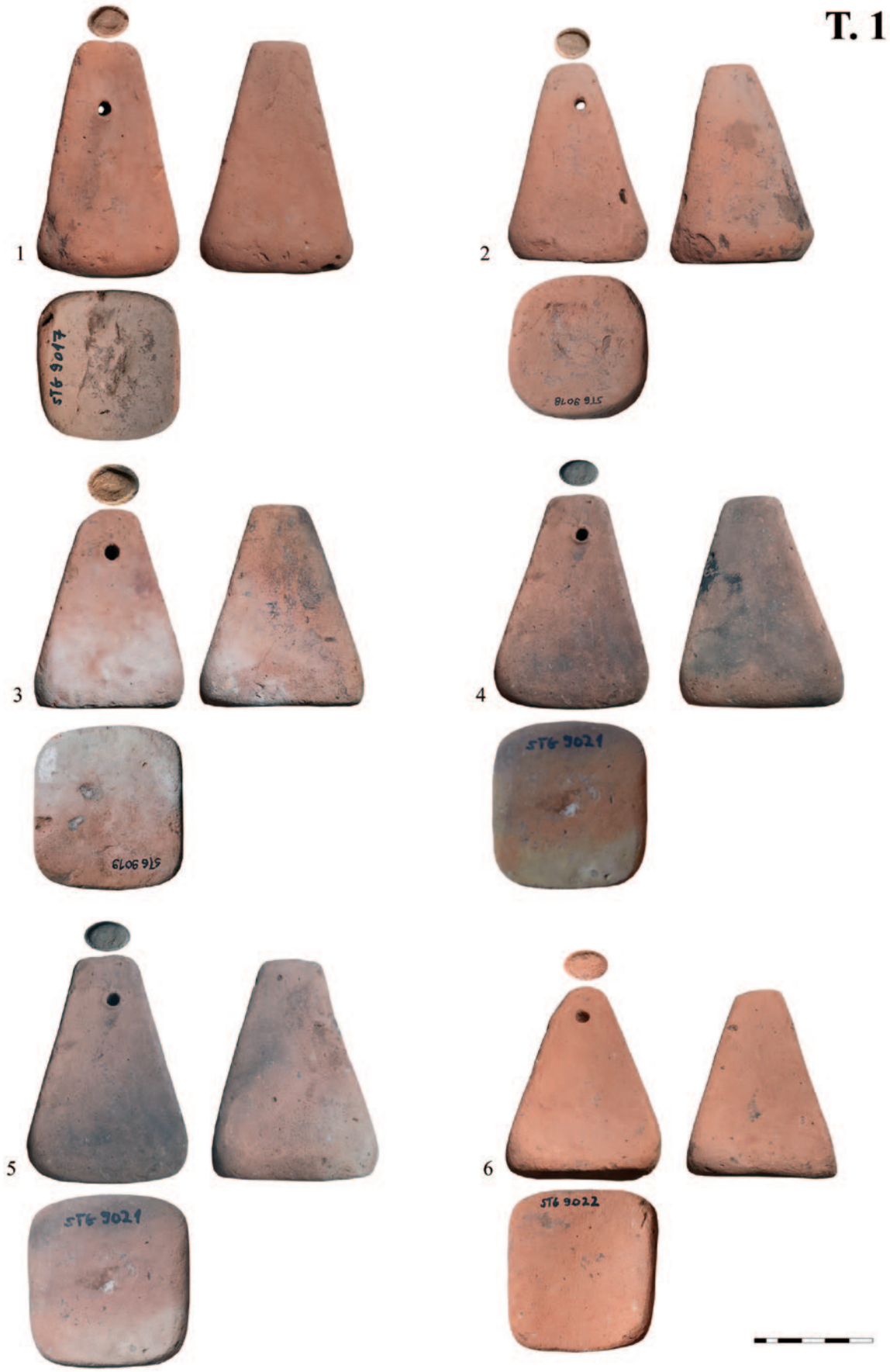
T. 6: 7 – konični uteg / conical loom weight (SG9054), V/S: 61 mm, PD: /, PV: 17 mm, PP: 3,5 mm, T/S: 73,7 g.

T. 7: 1 – trapezoidni uteg / trapezoidal loom weight (SG9016), V: 61 mm, ŠD: 41 mm, DD: 31 mm, ŠV: 42 mm, DV: 30 mm PP: 3 mm, T: 76,3 g.

T. 7: 2 – trapezoidni uteg / trapezoidal loom weight (SG9061), V: 83 mm, ŠD: 50 mm, DD: 49 mm, ŠV: / mm, DV: 33 mm PP: 5 mm, T: 244,6 g.

T. 7: 3 – diskoidni uteg / discoid loom weight (SG9062), promjer / diameter: 78 mm, debljina / thickness: 27 mm, PP: 8 mm, T: 173,4 g.

T. 7: 4 – diskoidni uteg / discoid loom weight (SG9063), V: 81 mm, širina / width: 64 mm, debljina / thickness: 30 mm, PP: 6 mm, T: 168,2 g.

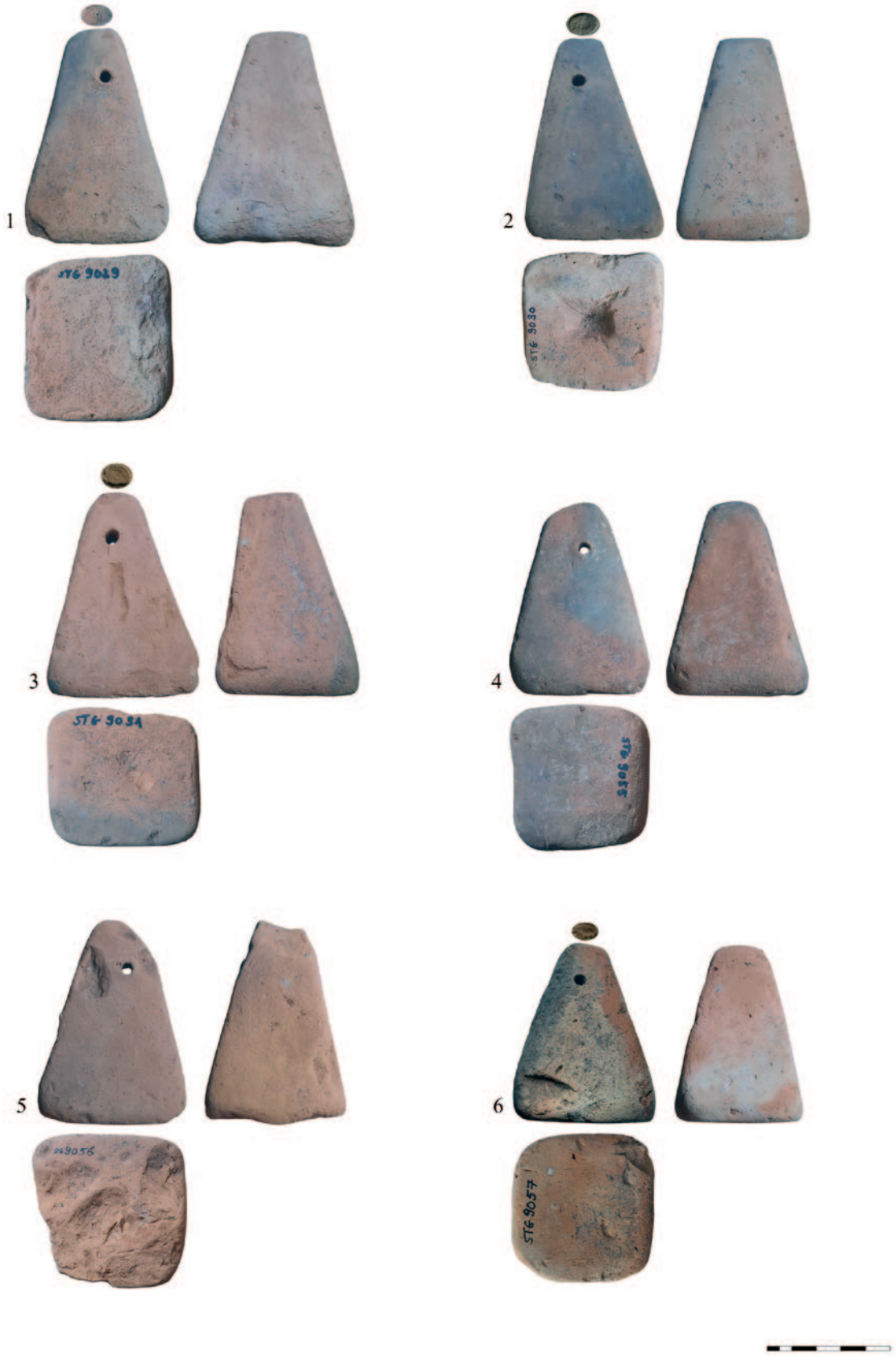



T. 1 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 1 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)

**T. 2**


T. 2 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 2 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)

T. 3




T. 3 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 3 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)

**T. 4**

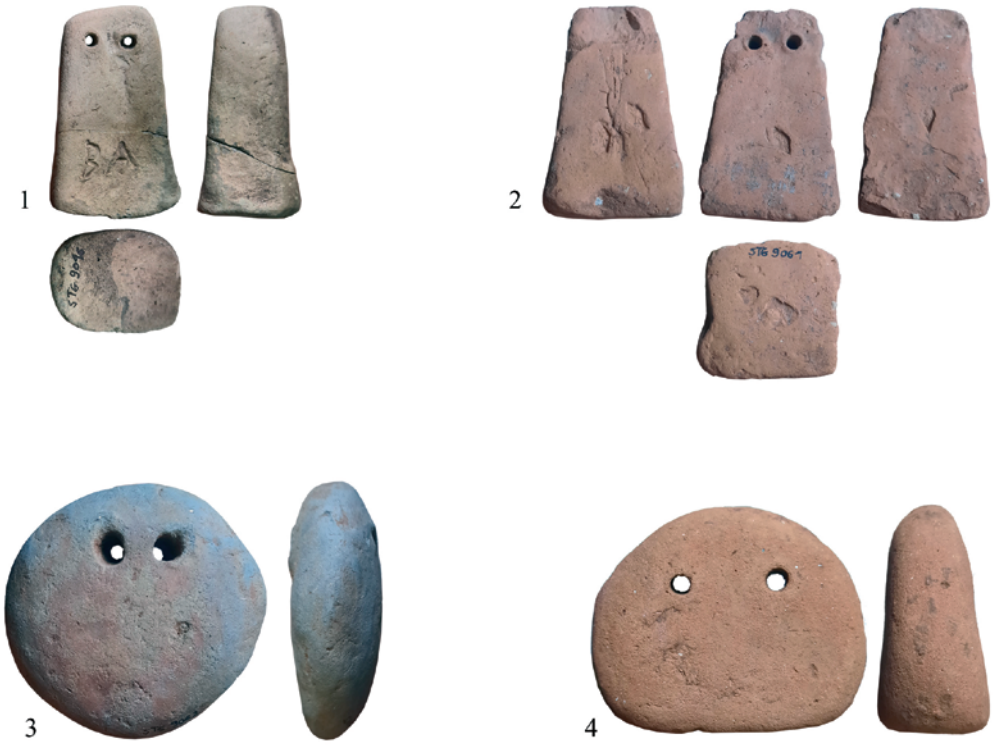

T. 4 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 4 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)


T. 5 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 5 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)

**T. 6**


T. 6 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 6 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)

# T. 7




T. 7 – Keramički utezi iz Vukovarske 2 (snimila i izradila: M. Korić)
Pl. 7 – Ceramic loom weights from Vukovarska 2 (photo and made by: M. Korić)