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STUDIA ARCHAEOLOGICA

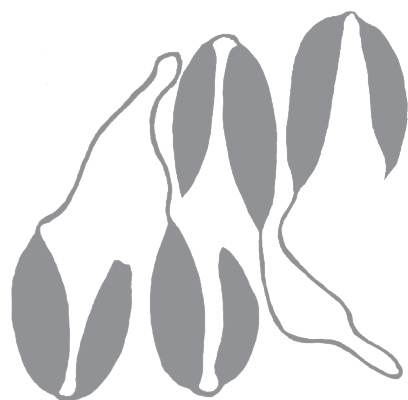
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# Early Neolithic inter-settlement pattern in the northwestern corner of the Banat

Petru Ciocani

**Abstract:** The considerable increase in the number of Early Neolithic sites identified in the last decades as a result of intensive field surveys has made it possible to assess the inter-settlement pattern of the first farmers in the northwestern corner of the Banat. The settlements are located at short distances one from the other, both on the edges of the elevated loess terraces and along watercourses, in a line-like pattern. They are small, with short-term occupations, suggesting they were frequently relocated. We argue that the deliberate measures taken by the early farming communities to adapt their subsistence strategies to the local environmental conditions unfavourable to primitive cultivation implied a less sedentary way of life and that this is the main reason behind the short-term occupation of the settlements and the absence of tells.

**Keywords:** settlement archaeology; prehistoric landscape; first farmers; subsistence; residential mobility.

## Introduction

Settlement archaeology emerged during the first half of the 20<sup>th</sup> century alongside the growing interest of archaeologists in the everyday life of the ordinary people of the past, their settlements, and the landscapes they lived in. By the mid-20<sup>th</sup> century, together with the emerging Processual Archaeology, the study of settlement patterns had already gained a key role in the archaeological interpretation<sup>1</sup>, and its significance grew in the following decades as new theoretical concepts emerged and computer methods began to be applied to archaeology, opening new analytical perspectives<sup>2</sup>.

During more than a century of research on settlement patterns, two main methodological directions have developed: the intra-settlement pattern that focuses on individual sites and their internal structure, and the inter-settlement pattern that deals with the configuration of the sites within a region. The second approach is commonly used to determine the way people lived in a particular landscape, the manner settlement patterning changed over time, and to identify the relationships between the different settlement types, and the occupation density of a certain region<sup>3</sup>.

The current study analyses the Early Neolithic inter-settlement pattern in the northwestern corner of Banat with the aim of inferring the preferred locations for human settling in the landscape, the type of spatial arrangement of the settlements, the occupation strategy employed, and the reasons behind this strategy.

The study period, known as the Early Neolithic, encompasses roughly the first half of the 6<sup>th</sup> millennium BC<sup>4</sup>. It commences with the settling of the region by farming communities of southern origin, who introduced the first crops and domestic animals, and produced a specific style of pottery known as the Starčevo-Körös-Criş, whose most distinctive feature is the fingernail impression decoration. The study period ends shortly after the middle of the 6<sup>th</sup> millennium when this pottery style is replaced by the newly emerging Vinča style<sup>5</sup>.

<sup>1</sup> Parsons 1972; Bintliff 2004, 55–56.

<sup>2</sup> Bintliff 2004, 56.

<sup>3</sup> Parsons 1972, 140–142; Bintliff 2003, 56–58.

<sup>4</sup> Quitta, Kohl 1969; Whittle *et al.* 2002; Biagi *et al.* 2005; Krauß *et al.* 2018. Currently, the earliest absolute date obtained from an Early Neolithic context in the study region is OxA-9396 7030±50 (5914±58 cal BC). The date was determined by accelerator mass spectrometry dating (AMS) on a human skull fragment from a grave at Deszk – Olajkút 1 (Whittle *et al.* 2002, 115). The date is calibrated in CalPal v. 2016.4 (Weninger, Jöris 2004) on the basis of the INTCAL13 standard calibration curve (Reimer 2013).

<sup>5</sup> Banner, Párducz 1946–1948, 35–39; Boric 2009, 234. The earliest radiocarbon date obtained from a Vinča context in the study region is Bln-479 6460±80 (5418±70 cal BC). The radiometric measurement is made on a charcoal sample from a

## The environment

The Banat is a historical and geographical region nearly rectangular in shape (stretching over three countries – Hungary, Romania and Serbia), whose northwestern corner lies at the confluence of two large rivers, the Mureş and the Tisza converging at almost a right angle (Fig. 1). The study region occupies an area of ca. 2800 km<sup>2</sup> on a low sedimentary plain formed mainly by fluvial depositions, and to a lesser degree by aeolian accumulations<sup>6</sup>. The topographical relief of the western part of the study region is more prominent and consists of slightly elevated loess terraces, formed during the Pleistocene, surrounded by a floodplain of Holocene age<sup>7</sup>. On the other hand, the terrain of its central and eastern parts has a uniform flat appearance. The region has a very low gradient<sup>8</sup>, which is why it was poorly drained in the past. Only in modern times was drainage improved by human intervention, which, however, required major transformations of the hydrographic system<sup>9</sup>. This consisted of regulating the courses of the two main rivers, the Mureş and the Tisza, introducing the existing streams<sup>10</sup> into a system of canals where their courses were often changed, and draining the swamps. For this reason, the present-day hydrographic system is much different from the one existing in the past.

There are two main ways to get a better understanding of what the hydrographic system might have looked like in the past: by examining old maps, and on the basis of paleoenvironmental studies. For this purpose, we have chosen the earliest detailed map of the region (scale 1:126000), namely the Habsburg military map known as *Mappa von den Csanader District* (Fig. 2), which was drawn up a few years before land amelioration works started. This map shows that in the 18<sup>th</sup> century, the eastern part of the study region was crossed by a very wide and dry riverbed, which corresponds to the present-day canalised Galaţca Stream, and which in fact was a paleochannel of the Mureş River (see below). The map also indicates that the western part of the region was crisscrossed by numerous narrow paleochannels, most of which were still carrying water at the time, and that large areas around them were marshy. Most of these narrow paleochannels are old riverbeds of the Mureş and fewer of the Tisza. This testifies that the two large rivers often shifted their courses in the past and flooded the low areas in the western part of the study region. It is also possible that the Mureş could have had several active divagation channels during the periods of increased discharge.

Paleodrainage studies show that, in general, the rivers in the Eastern Pannonian Plain produced several times more discharge at the termination of the Pleistocene than they do at present, and that their discharge values steadily decreased during the Holocene<sup>11</sup>. The Tisza had a stabilized course throughout the Holocene, flowing more or less on its current course<sup>12</sup>. Its discharge and meanders, however, were several times greater than today<sup>13</sup>. A paleodrainage study of the alluvial fan of the Mureş<sup>14</sup> suggests that the river abruptly changed its old north-westerly course around 6500 BC and turned southwest, creating a new course corresponding to that of the modern Galaţca Stream (Fig. 3); it then turned west by ca. 4100 BC and flew more or less on the valley of the modern Mureşan Stream. This interpretation, however, is in disagreement with the archaeological discoveries, which point to a slightly different scenario: the fact that the Early Neolithic sites in the Dudeştii Vechi-Sânnicolau Mare area are disposed along an old course of the Mureşan (see below) implies that this course must have already been active in the first half of the 6<sup>th</sup> millennium BC; another possibility is that the Mureşan was a secondary divagation branch of the old Mureş, and both were simultaneously active. To clarify this question, additional paleoenvironmental research is needed. Another study on the Mureş River<sup>15</sup> indicates that its present-day bankfull discharge at Makó (Hungary) is 850 m<sup>3</sup>/s, while that on its old

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pit in Tiszasziget – Andróé-alja (formerly known as Ószentiván VIII) (Quitta, Kohl 1969, 244–245). The date is calibrated in CalPal v. 2016.4 (Weninger, Jöris 2004) using the INTCAL13 calibration curve (Reimer 2013).

<sup>6</sup> Букуров 1961, 15–17; Posea 1997, 385–387.

<sup>7</sup> Букуров 1961, 20–22.

<sup>8</sup> Posea 1997, 387.

<sup>9</sup> Posea 1997, 388; Pop 2005, 25.

<sup>10</sup> These are not streams in the strict sense of the word but are old courses or secondary branches of the Mureş that are supplied mainly by Mureş (Букуров 1961, 21; Ianoş *et al.* 1997, 60–61; Posea 1997, 319–320, 387).

<sup>11</sup> Kiss *et al.* 2015, 53.

<sup>12</sup> Kiss *et al.* 2015, 147.

<sup>13</sup> Kiss *et al.* 2012a, 9.

<sup>14</sup> Kiss *et al.* 2014, 55.

<sup>15</sup> Kiss *et al.* 2012b, Tab. 3.



course at Pesac (Romania) was  $1970 \pm 290 \text{ m}^3/\text{s}$ , suggesting that the discharge of the Mureş during the Neolithic was twice as high as it is today. Therefore, it is highly likely that during the study period the floods have been larger in scale than those in the modern times indicated on the Habsburg military map (Fig. 2).

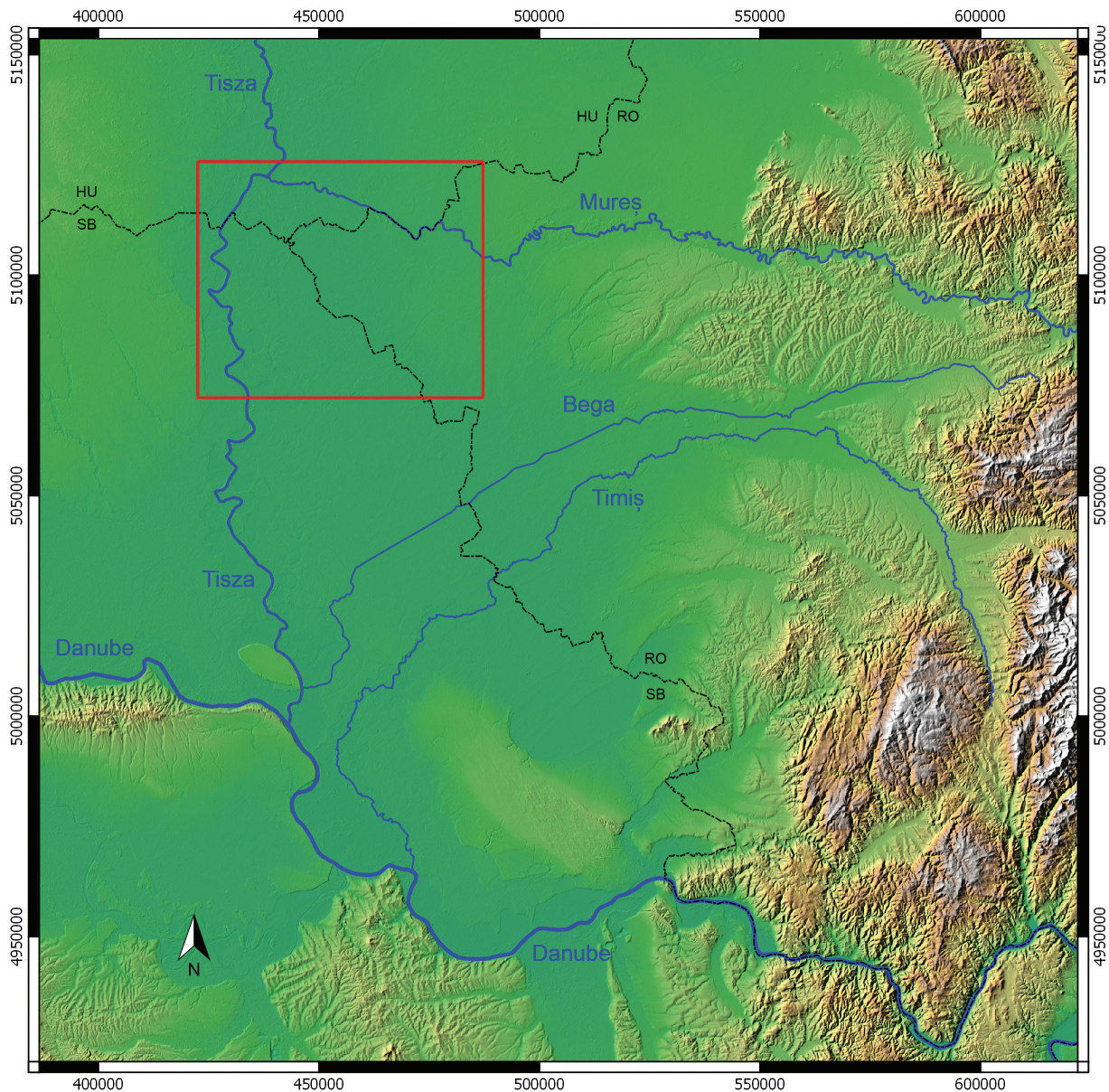


Fig. 1. Location of the northwestern corner of Banat (WGS 84/UTM zone 34N coordinate system).

The climate, in general, was warmer and drier than it is today<sup>16</sup>, however, at the very beginning of the study period, it may have been somewhat cooler since it coincided with the latter part of the 6200 cal BC Rapid Climate Change event, which was the most dramatic climatic disruption of the entire Holocene<sup>17</sup>. This event is identifiable in a variety of terrestrial and marine paleoclimate records distributed worldwide<sup>18</sup>, including a stalagmite isotopic record in Poleva Cave, about 130 km southeast of the study region<sup>19</sup>, and two pollen profiles in the Gutâiului Mountains, some 280 km northeast of the study region<sup>20</sup>. The two pollen records show a decline in mean annual temperature

<sup>16</sup> Constantin *et al.* 2007, 334; Magyari *et al.* 2010, 928–930; Kiss *et al.* 2015, 145.

<sup>17</sup> Weninger *et al.* 2014, 8–10, and references therein.

<sup>18</sup> Mayewski *et al.* 1997; Mayewski *et al.* 2004.

<sup>19</sup> Constantin *et al.* 2007.

<sup>20</sup> Feurdean *et al.* 2008.

of ca. 1.5–2 °C and in mean temperature of the coldest month of ca. 2–4 °C, as well as a potential increase in seasonality.

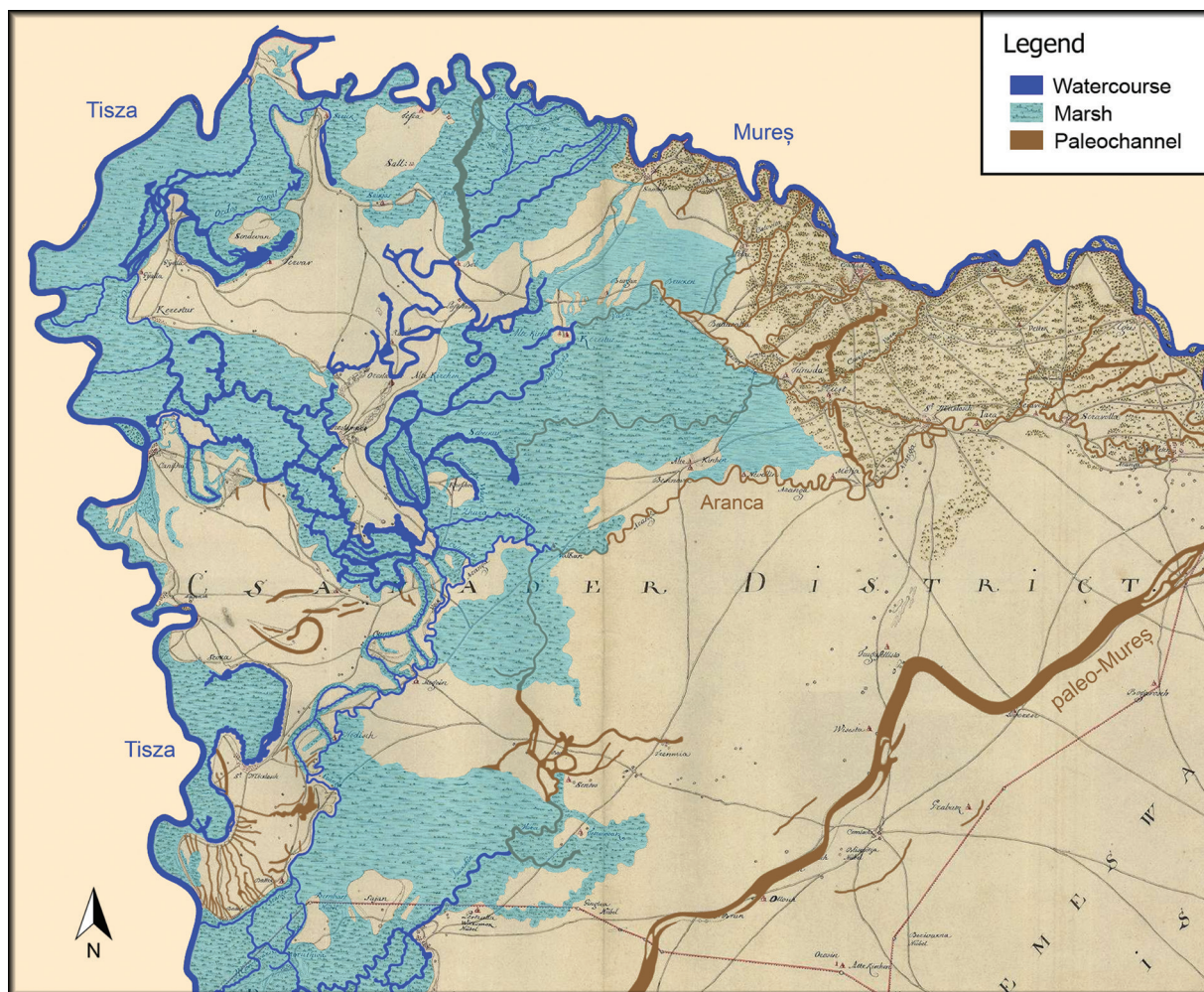


Fig. 2. The hydrographic system of the northwestern corner of Banat at the beginning of the 18<sup>th</sup> century, as indicated on the *Mappa von den Csanader District*, 1721, unknown author (adapted).

The aforementioned modern era transformations of the hydrographic system, coupled with the extensive agricultural exploitation of the region have significantly affected its ecosystem<sup>21</sup>. Another factor that played an important role in this process is deforestation, which had already started in the Early Neolithic, intensified in the Bronze Age<sup>22</sup>, and continued to be practised on a large scale in the following millennia until modern times, when almost no forest remained<sup>23</sup>. These factors have fundamentally modified the landscape, transforming it into an agricultural landscape with a steppe-like appearance<sup>24</sup>. Paleopalynological and archaeobotanical investigations on macroremains, however, reveal that the Early Neolithic vegetation was much more diverse, consisting of open woodlands intermingled with marshes<sup>25</sup>. In this diverse environment, a large variety of edible plant and animal species existed, constituting an important source of nutrition for the Early Neolithic communities.

It is worth noting that during the Early Neolithic, not far from the study region, to the northwest, lied the so-called *Central European – Balkan agroecological barrier*, which was defined as a combination of unfavourable environmental settings for the cultivation of crops and breeding of animals of

<sup>21</sup> Munteanu, Munteanu 1998, 41.

<sup>22</sup> Guminor, Stobbe 2021, 55–57; Kadereit *et al.* 2006, 36.

<sup>23</sup> Posea 1997, 323.

<sup>24</sup> Posea 1997, 387.

<sup>25</sup> Guminor, Stobbe 2021, 55; Krauß *et al.* 2018, 162–170.

near eastern origin<sup>26</sup>. The proximity of this ecological barrier to the study region had an impact on the subsistence strategy of the Early Neolithic communities (see below).

### State of research

Archaeological research in the corner formed by the Tisza and the Mureş rivers had already begun in the late 19<sup>th</sup> and the early 20<sup>th</sup> century when enthusiastic Austro-Hungarian researchers discovered and archaeologically investigated several Early Neolithic sites<sup>27</sup>. This pioneering research, however, was interrupted by the First World War and the amendments that followed the war, when the region was divided between three national states, namely Hungary, Romania, and Yugoslavia (currently Serbia). This has negatively impacted the research and it was not until the 1960s that the archaeological investigations began again in full swing, consisting primarily of surface field surveys. Several series of such surveys were conducted by Milorad Girić in the 1960s and 1970s<sup>28</sup>, Edit Matuz in the 1970s<sup>29</sup>, Constantin Kalcsov in the 1980s, 1990s and 2000s<sup>30</sup>, Dániel Pópity in the 2000s<sup>31</sup>, and the research culminated with the extensive systematic surveys undertaken within the *Arheološka Topografija Banata* project, directed by Stanko Trifunović in the 2000s<sup>32</sup>.

All these investigations led to the identification of 94 Early Neolithic sites permitting the assessment of the inter-settlement pattern. The northwestern corner of the Banat, however, is far from being fully explored and numerous areas have been poorly surveyed or not surveyed at all. In fact, solely the administrative districts of Banatsko Aranđelovo, Čoka, Crna Bara, Đala, Jazovo, Majdan, Novi Kneževac, Ostojićevo, Padej, Sanad, Srpski Krstur, Tiszasziget and Vrbica have been surveyed over their entire areas. Hence, the scarcity or absence of sites in other parts of the region represents nothing but the current state of research.

### Spatial distribution of the settlements

Of the 94 identified sites (Tab. 1), 20 have been investigated through archaeological excavations<sup>33</sup>. The investigations show that these sites were village-like settlements. Judging by the invasively investigated sites and the investigation results obtained within the broader region<sup>34</sup>, it can be inferred that all the discovered Early Neolithic sites represent village-like settlements. These settlements were occupied by a population of farmers that colonized the previously uninhabited or almost<sup>35</sup> uninhabited study region at the beginning of the 6<sup>th</sup> millennium BC. They brought with them several crops (cereals and pulses) and domestic animals (cattle, sheep, goats and pigs) of southwestern Asian origin, and practised an economy based upon food production in combination with hunting, fishing, and gathering<sup>36</sup>, which allowed them to permanently settle this region.

Almost all settlements can be categorized as flat settlements. Four of them, namely Dudeştii Vechi – Movila lui Deciov, Novi Kneževac – Şirine, Idoş – Gradište and Beba Veche – 1 & 2 have a tell-like

<sup>26</sup> Kertész, Sümegi 2001.

<sup>27</sup> see Reizner 1892; Milleker 1893; Reizner 1903; Kisléghi Nagy 1907; Kisléghi Nagy 1909.

<sup>28</sup> Girić 1972.

<sup>29</sup> Matuz, Béres 2000.

<sup>30</sup> Constantin Kalcsov identified 15 Early Neolithic sites in the Dudeştii Vechi-Sănnicolau Mare area (see Kalciov 1999; Kalcsov 2006; Ciocani, Jozsa 2015). These sites have recently been surveyed by the author and only 9 of them have been confirmed to be of Early Neolithic age. The present study includes only the confirmed sites.

<sup>31</sup> Pópity 2006.

<sup>32</sup> Трифуновић и др. 2012; 2016.

<sup>33</sup> The following sites have been investigated by archaeological excavations: Crna Bara – 8; Deszk – G; Deszk – I (Okopidúló); Deszk – Olajkút 1; Dudeştii Vechi – Cociohatul Mic, Mihoc; Dudeştii Vechi – Kalcsov 1; Dudeştii Vechi – Movila lui Deciov; Idoş – Gradište; Kiszombor – D; Klárafalva – Vasút utca; Mokrin – Hegedişev vinograd; Novi Kneževac – Budžak-slatina; Padej – Barnahat; Rabe – Šaširaš; Sajan – Domboš (Jaroš); Sănnicolau Mare – Bucova Pusta IV; Sănnicolau Mare – Bucova Pusta VI; Szeged – Szőreg, Téglagyár; Tiszasziget – Andróé-alja (Ószentiván VIII); Tiszasziget – Szélmalom domb (Ószentiván I & II).

<sup>34</sup> Paluch 2012b; Greenfield, Jongsma 2008; Lazarovici, Lazarovici 2006, 69–70; Garašanin 1979, 120.

<sup>35</sup> Currently, there are no archaeological traces discovered from earlier ages (Paleolithic or Mesolithic) in the northwestern corner of the Banat, however, there is no reason to exclude the possibility that mobile groups of hunter-gatherers transited this territory in pursuit of herds, or occasionally settled for a short time.

<sup>36</sup> Krauß *et al.* 2018.

appearance, but apart from the former site, they cannot be regarded as true Early Neolithic tells, because their thick cultural deposits accumulated during the later periods of occupation. Furthermore, the Movila lui Deciov tell, with its ca. 2 m thick cultural deposits, is quite small when compared to the synchronous tell sites in the southern Balkans<sup>37</sup>.

The data on the sites considered in this study come primarily from the scientific literature and vary quantitatively and qualitatively, especially in what concerns the location of the sites. For this reason, we have divided the sites into three categories according to their localization accuracy: precise, approximate, and unknown. The first category primarily includes sites from publications, whose geographical coordinates or position are indicated on large-scale maps and satellite images, as well as sites verified directly by the author. The second category includes sites for which publications either provide a detailed descriptive localization by pointing out their location in relation to modern landmarks or indicate the microtoponym of the area. Topographic maps<sup>38</sup> and Habsburg military maps<sup>39</sup> were used to localise the sites with a descriptive location. The margin of error of the sites with approximate location is estimated at ca. 0.5 km. The third category includes sites where location is given only very vaguely in the publications, most often only by the name of the modern locality where the site is located.

In the western part of the study region, where the plain has a more pronounced relief, the settlements are disposed along the edges of the elevated loess terraces, overlooking the low plain, which was periodically flooded by the meandering rivers crossing it. In the central part of the study region, where the terrain is much more uniform, the settlements are distributed along an old course of the Mureşan Stream (previously known as Gorn[y]a Aranka). The distribution of the sites along this watercourse indicates that it was already active during the Early Neolithic, but it flowed slightly further south. On the *Mapa von den Csanader District*, this whole area appears to be marshy (Fig. 2), and likely this was also the case in the Early Neolithic when the rivers had a higher discharge (see afore). This may explain why the settlements in the central part of the region lie on natural levees. Similar conditions are attested in the neighbouring region to the north, where Early Neolithic settlements are also located on the floodplain<sup>40</sup>. On the same map, the eastern part of the Mureşan appears to be dry, which suggests that this watercourse was already abandoned at the beginning of the 18<sup>th</sup> century or was active only at times<sup>41</sup>. The still very low number of Early Neolithic settlements identified in the eastern part of the study region does not allow conclusions to be drawn on settlement distribution.

Overall, the Early Neolithic settlements exhibit a very regular patterning. They are located thread-like, along watercourses and terrace edges at a distance of ca. 1–2 km one from the other (Fig. 3). Apparently, the short distance between the settlements may suggest a high density of occupation and implicitly a large Early Neolithic population, which is usually explained as the consequence of favourable environmental conditions<sup>42</sup>. Yet, if one considers the short-lived occupations of most settlements indicated by the shallowness of their cultural deposits<sup>43</sup>, it becomes evident that the majority of the settlements were not occupied simultaneously but rather successively. This occupation pattern reflects the not-yet-fully sedentary lifestyle of the Early Neolithic communities, which to a greater extent was dictated by their subsistence.

Crops domesticated in Southwestern Asia and introduced by the early farming communities within Southeastern Europe, especially in the northern part of this region, required a phase of adaptation to

<sup>37</sup> For comparison see Gimbutas 1974a; Gimbutas 1974b; Reingruber 2005; Pavúk, Čochadžiev 1984; Nikolov *et al.* 1992; Андреев 1965; Георгиев 1963.

<sup>38</sup> Topografska karta 1:50.000, Vojnogeografski institut, drugo izdanje, 1983.

<sup>39</sup> <http://mapire.eu/en/>.

<sup>40</sup> Paluch 2012b, 49.

<sup>41</sup> On the *Josephinian Cadastral Survey* (*Josephinische Landesaufnahme*), drawn up between 1769 and 1772, the Mureşan, although disconnected from the Mureş and the Tisza, is filled with water. This indicates that it could have been activated in times of high discharge functioning as a secondary divagation channel of the Mureş.

<sup>42</sup> See Paluch 2012b, 49.

<sup>43</sup> Most of the sites investigated have cultural deposits thinner than 1 m (see Гирић 1957, 219; Трифуновић и др. 2016, 56; Ciocani, Jozsa 2015, 19), although the investigations usually target larger and more prominent sites. Furthermore, radiometric analyses show that even the very few sites with more than 1 m thick Early Neolithic cultural layers were not inhabited for a very long time (Krauß *et al.* 2018, 161; Ciocani, Jozsa 2015, Fig. 16). These sites contrast with the Middle and Late Neolithic sites, which were long-lived and accumulated thick cultural deposits (see for comparison Banner 1960; Трифуновић и др. 2012, 191; Kalicz 2013) and with the Early Neolithic tells in the southern Balkans (see footnote 37).

the temperate climate<sup>44</sup>. And the requirement for such a phase must have been all the more necessary in the study region, which was in the immediate vicinity of the *Central European – Balkanic agroecological barrier* (see afore). During this phase, the crops could not have been exploited to their maximum potential and the risk of harvest failure was relatively high. Aware of this, the Early Neolithic communities employed a subsistence strategy based primarily on herding and gathering, and less on cultivating, but which required a certain degree of residential mobility<sup>45</sup>. This deliberate adaptation of the subsistence to the local environmental conditions is thus the primary reason for the frequent relocation of the settlements, and this must also have been the main reason for the delayed appearance of the tell settlements. Considering that the northern part of Southeastern Europe neolithised relatively swiftly<sup>46</sup>, it can be assumed that the colonising farmers have adjusted their subsistence to the local conditions quite rapidly.

Since most of the settlements were not occupied simultaneously, the actual density of occupation (number of settlements inhabited at the same time) cannot be evaluated at the current state of research. Such an assessment will only become possible if more sites are invasively investigated and if the number of radiocarbon measurements increases<sup>47</sup>.

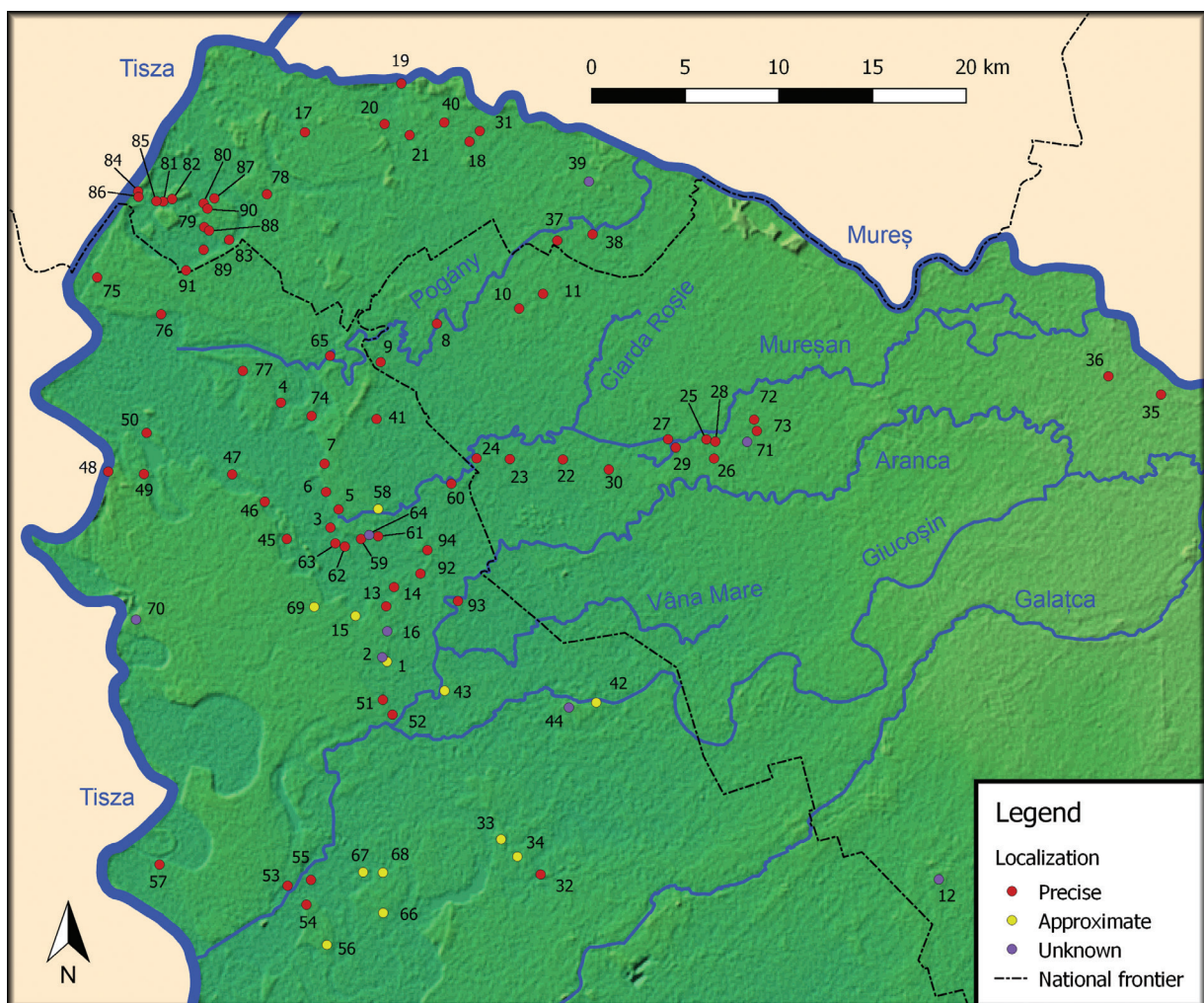


Fig. 3. Distribution of the Early Neolithic archaeological sites in the northwestern corner of the Banat. Numbers on the map correspond to numbers in Table 1.

<sup>44</sup> Tringham 1971, 71; Barker 1989, 95; Halstead 1989, 40; Greenfield 1993, 111.

<sup>45</sup> Ciocani 2018, 146.

<sup>46</sup> Whittle *et al.* 2002; Biagi *et al.* 2005, 45.

<sup>47</sup> Ciobotaru *et al.* 2020, 54.

## Conclusions

In Early Neolithic times, the northwestern corner of the Banat had a much more diverse landscape than today, consisting of open woodland intermixed with large marshy areas. The marshes were formed by the regular flooding of the two major rivers, the Mureş and the Tisza, which had much higher discharges than nowadays.

At the beginning of the 6<sup>th</sup> millennium BC, this diverse environment was colonized by communities of farmers from the south, who introduced the first crops and domestic animals. They built relatively small and briefly inhabited settlements that were frequently relocated along the edges of the elevated loess terraces in the western part of the study region, and along the watercourses in the central part of the region. The settlements stretched thread-like and not far apart from each other.

The frequent relocation of the settlements is a direct consequence of the subsistence strategy, relying primarily on herding and gathering and to a lesser extent on crop cultivation, and thus implying a certain level of residential mobility. This subsistence strategy was deliberately chosen by the colonizing farmers to counteract the low productivity of their crops, which were not adapted to the local environmental conditions and required a phase of acclimatization. Therefore, the farming communities played an active role in the process of socio-cultural dynamics by taking intentional measures to adjust their lifestyle to the local conditions, while the environment should be seen as an indirect factor influencing the process of socio-cultural development, to which human communities could have responded in different ways.

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Table 1. Early Neolithic sites in the northwestern corner of the Banat. Numbers in table correspond to numbers on the map (Fig. 3.). Site coordinate are given in WGS 84/UTM zone 34N reference system.

No. site	Site name	x	y	Localization	Literature
1	Banatski Monoštor – Bašće	444380	5089435	Approx.	Girić 1972: 174, no. 17
2	Banatski Monoštor – Humka			Unknown	Arandjelović-Garašanin 1954: 40, no. 30; Girić 1972: 175, no. 18
3	Banatsko Arandelovo – 10	441404	5096662	Precise	Трифуновић и др. 2012: 263–265
4	Banatsko Arandelovo – 17	438811	5103384	Precise	Трифуновић и др. 2012: 270
5	Banatsko Arandelovo – 59	441854	5097633	Precise	Трифуновић и др. 2012: 306, 308
6	Banatsko Arandelovo – Brdo-zapad	441187	5098577	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 12; Трифуновић и др. 2012: 305, site 56
7	Banatsko Arandelovo – Obala selešto	441121	5100088	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 11; Трифуновић и др. 2012: 297, no. 51
8	Beba Veche – 1 & 2	447220	5107541	Precise	Ciobotaru et al. 2020: 40–42
9	Beba Veche – 11	444182	5105507	Precise	O.-C. Rogozea, pers. comm., 04.08.2020
10	Cherestur – 1	451634	5108310	Precise	Ciobotaru et al. 2020: 43–44
11	Cherestur – 2	452918	5109087	Precise	Ciobotaru et al. 2020: 44–45
12	Comloșu Mic			Unknown	Lazarovici 1969: 3, no. 8; Lazarovici 1979: 192; Luca 2010: 74
13	Crna Bara – 20	444361	5092408	Precise	Трифуновић и др. 2016: 67
14	Crna Bara – 8	444792	5093433	Precise	Трифуновић и др. 2016: 56
15	Crna Bara – Prkos	442700	5091904	Approx.	Girić 1972: 178, no. 30
16	Crna Bara – Road to Vălcani			Unknown	Kisléghi Nagy 1912: 316–317; Arandjelović-Garašanin 1954: 40, no. 33
17	Deszk – B, C, E	440244	5117848	Precise	Paluch 2012a: 298
18	Deszk – G	449044	5117265	Precise	Paluch 2012a: 298
19	Deszk – I (Okopi-dűlő)	445424	5120400	Precise	Paluch 2012a: 298
20	Deszk – Olajkút 1	444507	5118246	Precise	Trogmayer 1967; Trogmayer 1968: 8; Paluch 2012a: 298
21	Deszk – Ordos csatornánál	445844	5117640	Precise	Paluch 2012a: 299
22	Dudeștii Vechi – Canalul Nou	453918	5100204	Precise	Ciobotaru et al. 2020: 45
23	Dudeștii Vechi – Cociohatul Mic, Ferma 3	451072	5100250	Precise	Ciobotaru et al. 2020: 46
24	Dudeștii Vechi – Cociohatul Mic, Mihoc	449287	5100305	Precise	Ciocani, Jozsa 2015: 24, site 17
25	Dudeștii Vechi – Drumul Cenadului	461628	5101227	Precise	Ciocani, Jozsa 2015: 26, site 21
26	Dudeștii Vechi – Kalcsov 1	462028	5100201	Precise	Kalciov 1999: 154, site 2; Ciocani, Jozsa 2015: 19, site 1
27	Dudeștii Vechi – Movila lui Deciov	459568	5101252	Precise	Kisléghi Nagy 1909; Maillol et al. 2004
28	Dudeștii Vechi – Orezărie	462105	5101109	Precise	Kalciov 1999: 154, site 4; Ciocani, Jozsa 2015: 20, site 2

No. site	Site name	x	y	Localization	Literature
29	Dudeștii Vechi – Pescărie	459975	5100801	Precise	Kalciov 1999: 158, site 78; Ciocani, Jozsa 2015: 26, site 20
30	Dudeștii Vechi – Toncivotu	456378	5099651	Precise	Kalciov 1999: 157, site 50; Ciocani, Jozsa 2015: 23, site 13 Paluch 2012a: 300.
31	Ferencszállás – Somogyi-dűlő	449599	5117828	Precise	Arandjelović-Garašanin 1954: 41, no. 38; Гирић 1957; Marić et al. 2016
32	Idoš – Gradište	452551	5077928	Precise	Girić 1972: 176, no. 26
33	Idoš – Kečkeler	450438	5079833	Approx.	Brukner 1968: 39, note 58; Girić 1972: 176, no. 25
34	Idoš – Livade	451308	5078895	Approx.	Ionescu 2015, site 50; O.-C. Rogozea, pers. comm., 04.08.2020
35	Igrış – 55 (Vaoș)	486026	5103531	Precise	Ionescu 2015, site 30; O.-C. Rogozea, pers. comm., 04.08.2020
36	Igrış – 8 (Iarc)	483209	5104515	Precise	Paluch 2012a: 305–306
37	Kiszombor – 65	453703	5111936	Precise	Paluch 2012a: 306
38	Kiszombor – 80	455596	5112258	Precise	Paluch 2012a: 305
39	Kiszombor – D			Unknown	Paluch 2012a: 306
40	Kláralfalva – Vasút utca	447702	5118299	Precise	Трифуновић и др. 2012: 243, 245
41	Majdan – 39	443937	5102458	Precise	Arandjelović-Garašanin 1954: 42, no. 4; Girić 1972: 175, no. 21
42	Mokrin – Hegedišev vinograd	455613	5087147	Approx.	Girić 1972: 175, no. 20.
43	Mokrin – Papir	447462	5087844	Approx.	Brukner 1968: 39; Girić 1972: 175, no. 22
44	Mokrin – Ritić			Unknown	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 13; Трифуновић и др. 2012: 165, site 49
45	Novi Kneževac – Brestik	439059	5096073	Precise	Girić 1972: 179, no. 36; Трифуновић и др. 2012: 202, site 6
46	Novi Kneževac – Budžak majur	437894	5098083	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 7; Трифуновић и др. 2012: 199, site 98
47	Novi Kneževac – Budžak-slatina	436161	5099566	Precise	Girić 1972: 173, no. 9; Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 4; Трифуновић и др. 2012: 195, site 93
48	Novi Kneževac – Park	429508	5099790	Precise	Girić 1972: 179, no. 37; Трифуновић и др. 2012: 192, site 89
49	Novi Kneževac – Širine	431424	5099633	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 3; Трифуновић и др. 2012: 124, site 5
50	Novi Kneževac – Širine-sever	431591	5101839	Precise	Girić 1972: 174, no. 16; Трифуновић и др. 2016: 203, no. 48
51	Ostojicevo – Nad Markučevom kopovom	444136	5087392	Precise	Girić 1972: 174, no. 15; Трифуновић и др. 2016: 203, no. 46
52	Ostojicevo – Talad	444646	5086587	Precise	Трифуновић и др. 2016: 322
53	Padej – 67	438918	5077440	Precise	Трифуновић и др. 2016: 280, no. 31
54	Padej – Barnahat	439919	5076411	Precise	Girić 1972: 173–174, no. 12; Трифуновић и др. 2016: 322, no. 70
55	Padej – Hatahat	440177	5077744	Precise	Girić 1972: 178, site 29
56	Padej – Ibelaj	441004	5074236	Approx.	

No. site	Site name	x	y	Localization	Literature
57	Padej – Pesir	432028	5078650	Precise	Girić 1972: 172, no. 7; Трифуновић и др. 2016: 322, no. 69
58	Podlokanj – Debelica	443978	5097635	Approx.	Girić 1972: 180, site 40; Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 18
59	Podlokanj – Južne Bašte	443043	5096034	Precise	Girić 1972: 180, site 41; Трифуновић и др. 2012: 333, site 93
60	Podlokanj – Kočovat	447921	5098955	Precise	Girić 1972: 180, site 38; Грчки-Станимиров, Станимиров-Грчки 2003: 57, site 19; Трифуновић и др. 2012: 330, site 87
61	Podlokanj – Selo-juг	443963	5096169	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 17; Трифуновић и др. 2012: 333, site 93
62	Podlokanj – Sirovičin Budžak-istok	442171	5095635	Precise	Girić 1972: 180, site 42; Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 15; Трифуновић и др. 2012: 281–284, sites 31, 32 and 33
63	Podlokanj – Sirovičin Budžak-zapad	441661	5095812	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 15; Трифуновић и др. 2012: 279, site 29
64	Podlokanj – Velike Livade			Unknown	Girić 1972: 180, site 39; Трифуновић и др. 2012: 334, site a
65	Rabe – Šaširaš	441475	5105865	Precise	Girić 1972: 179, site 35; Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 8; Трифуновић и др. 2012: 228, site 28
66	Sajan – Domboš (Jaroš)	444052	5075932	Approx.	Brukner 1968: 38, note 57; Girić 1972: 178, site 28
67	Sajan – Kasalo	442994	5078130	Approx.	Girić 1972: 174, site 14
68	Sajan – Nagy port	444057	5078101	Approx.	Girić 1972: 174, site 13
69	Sanad – Sanadske livade	440493	5092409	Approx.	Girić 1972: 178, site 32
70	Sanad – Zlatan breg			Unknown	Girić 1972: 178, site 31
71	Sännicolau Mare – Bucova Pusta III.1 (Antonius)			Unknown	Kisléghi Nagy 1912: 312; Lazarovici 1979: 187–188
72	Sännicolau Mare – Bucova Pusta IV	464194	5102275	Precise	Kisléghi Nagy 1907: 266–278; Krauß et al. 2018
73	Sännicolau Mare – Bucova Pusta VI	464335	5101667	Precise	Kisléghi Nagy 1907: 278–279; Ciocani, Jozsa 2015: 20, no. 3
74	Siget – Jug sela	440451	5102652	Precise	Грчки-Станимиров, Станимиров-Грчки 2003: 59, site 9; Трифуновић и др. 2012: 332, site 89
75	Srpski Krstur – 1	429032	5110200	Precise	Трифуновић и др. 2012: 57–59
76	Srpski Krstur – 11 & 12	432437	5108185	Precise	Трифуновић и др. 2012: 70–74
77	Srpski Krstur – 34	436790	5105107	Precise	Трифуновић и др. 2012: 95–98
78	Szeged – Szőreg, Téglagyár	438179	5114552	Precise	Trogmayer 1977: 53; Paluch 2012a: 313
79	Tiszasziget – Agyagbánya	434803	5112828	Precise	Pópoly 2006: 108–110, site 31 și 32; Paluch 2012a: 318
80	Tiszasziget – Andróé-alja (Ószentiván VIII)	434782	5114095	Precise	Kutzián 1961; Matuz, Béres 2000: 55; Paluch 2012a: 318
81	Tiszasziget – Csűrű-föld I	432614	5114220	Precise	Pópoly 2006: 108, site 12; Paluch 2012a: 319

No. site	Site name	x	y	Localization	Literature
82	Tiszasziget – Csűrű-föld II	433099	5114346	Precise	Pópty 2006: 108, site 12; Paluch 2012a: 319
83	Tiszasziget – Jató II	436129	5112134	Precise	Matuz, Béres 2000: 55; Pópty 2006: 108, site 35; Paluch 2012a: 320
84	Tiszasziget – Kónya-tanya	431280	5114770	Precise	Paluch 2012a: 319
85	Tiszasziget – Papok földje	432254	5114248	Precise	Pópty 2006: 108–110, site 13; Paluch 2012a: 319
86	Tiszasziget – Szécsi-tanya	431299	5114481	Precise	Paluch 2012a: 319
87	Tiszasziget – Szélmalom domb (Őszen-tiván I & II)	435359	5114359	Precise	Banner, Párducz 1946–1948: 35; Matuz, Béres 2000: 55; Paluch 2012a: 319
88	Tiszasziget – Sziget-alja	435062	5112634	Precise	Pópty 2006: 108, site 33; Paluch 2012a: 320
89	Tiszasziget – Szüget-tető	434756	5111615	Precise	Paluch 2012a: 319
90	Tiszasziget – Tempлом domb (Őszen-tiván III)	434986	5113810	Precise	Paluch 2012a: 319–320
91	Tiszasziget – Térvár, Fehér-part II	433805	5110524	Precise	Pópty 2006: 108, site 55; Paluch 2012a: 320
92	Vrbica – 6	446217	5094145	Precise	Трифуновић и др. 2016: 41
93	Vrbica – 9	448221	5092656	Precise	Girić 1972: 175, no. 23; Трифуновић и др. 2016: 45
94	Vrbica – Škola	446604	5095403	Precise	Girić 1972: 178, site 33; Трифуновић и др. 2016: 45, no. 10



# Abbreviations

AEM	Archäologisch-epigraphische Mitteilungen aus Österreich-Ungarn, Vienna.
AM	Arheologia Moldovei, Iași.
AMN	Acta Musei Napocensis, Cluj-Napoca.
AMP	Acta Musei Porolissensis, Zalău.
AMV	Acta Musei Varnaensis, Varna.
Angustia	Angustia. Revista Muzeului Național al Carpaților Răsăriteni, Sf. Gheorghe.
Anuarul MJIAP (S.N.)	Anuarul Muzeului de Istorie și Arheologie Prahova, Serie Nouă, Ploiești.
Antiquity	Antiquity. A review of world archaeology, Durham.
Archaeological Journal	Archaeological Journal. New Series. Chișinău.
ArchÉrt	Archaeologiai Értesítő, Budapest.
ArchPol	Archaeologia Polona, Warsaw.
ArchRozhledy	Archeologické Rozhledy, Praha.
ASM	Archaeologica Slovaca Monographiae, Bratislava.
BAR (Int. S.)	British Archaeological Reports (International Series), Oxford.
Biharea	Biharea. Culegere de studii și materiale de etnografie și artă, Oradea.
BMG	Bibliotheca Musei Giurgiuvensis, Giurgiu.
BMJT	Buletinul Muzeului Județean Teleorman. Seria Arheologie, Alexandria.
BMM	Bibliotheca Musei Marisiensis, Târgu Mureș.
Budapest Régiségei	Budapest Régiségei Régészeti és Történeti Évkönyv. Budapest.
CA București	Cercetări arheologice în București, București.
CCA	Cronica Cercetărilor Arheologice, București.
CIL	Corpus Inscriptionum Latinarum, Berlin.
CsSzME	A Csíki Székely Múzeum Évkönyve. Csíkszereda.
Dacia (N.S.)	Dacia. Revue d'archéologie et d'histoire ancienne. Nouvelle serie. București.
Dolgozatok	Dolgozatok a Magyar Királyi Ferencz József Tudományegyetem Archaeológiai Intézetéből. Szeged.
EphNap	Ephemeris Napocensis, Cluj-Napoca.
Erdély	Erdély. Turistai, fürdőügyi és néprajzi folyóirat, Cluj-Napoca.
FontArchPrag	Fontes Archaeologici Pragenses, Prague.
Földtközl.	Földtani közlöny, Budapest.
HOMÉ	A Herman Ottó Múzeum Évkönyve, Miskolc.
ILD	C. C. Petolescu, <i>Inscripții latine din Dacia</i> , Bucharest 2005.
JAHA	Journal of Ancient History and Archaeology, Cluj-Napoca.
Jahrb. RGZM	Jahrbuch des Römisch Germanischen Zentralmuseums zu Mainz, Mainz.
JAMÉ	Jósa András Múzeum Évkönyve, Nyiregyháza.
Karpatika	Karpatika, Uzhorod.
LMI	List of Historic Monuments, updated 2015.
Marisia	Marisia. Studies and Materials. Archeology. Târgu-Mureș.
MCA (S.N.)	Materiale și Cercetări Arheologice Serie Nouă. București
MemAntiq	Memoria Antiquitatis, Piatra Neamț.
NNA	Nordisk Numismatisk Årsskrift, Stockholm.
PAS	Prähistorische Archäologie in Südosteuropa, Rahden/Westf.
PAT	Patrimonium Archaeologicum Transylvanicum, Cluj-Napoca.
Paléo	PALEO – Revue d'archéologie préhistorique, Les Eyzies-de-Tayac-Sireuil.
Pallas	Pallas. Revue d'études antiques, Toulouse.

PNAS	Proceedings of the National Academy of Sciences of the United States of America, Washington.
PZ	Prähistorische Zeitschrift. Berlin.
RAN	National Archaeological Repertory.
RM	Revista Muzeelor, București.
Sargetia	Sargetia. Acta Musei Devensis, Deva.
SatuMareSC	Satu Mare Studii și Comunicări, Satu Mare.
SCIV(A)	Studii și Cercetări de Istorie Veche și Arheologie, București.
SCȘMI	Studii și Comunicări Științifice ale Muzeelor de Istorie, București.
SIB	Studii de Istorie a Banatului, Timișoara.
SlovArch	Slovenská archeológia, Nitra.
SP	Studii de Preistorie, București.
St.Cerc.Antropol.	Studii și Cercetări de Antropologie, București.
StudUBB-G	Studia Universitatis Babeș-Bolyai. Seria Geologia, Cluj-Napoca.
ZborníkSlovNMA	Zborník Slovenského Národného Múzea. Archeológia, Bratislava.
ZSA	Ziridava. Studia Archaeologica, Arad.
ИАИ	Известия на Археологическия Институт при БАН, София.