

# A RECENT CONTRIBUTION TO THE ABSOLUTE CHRONOLOGY ON THE EARLY BRONZE AGE IN EASTERN ROMANIA\*

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**Cuvinte – cheie:** *Epoca bronzului, cronologie absolută, fortificație, Vânători-Neamț, estul României*

**Keywords:** *Bronze Age, absolute chronology, fortification, Vânători-Neamț, Eastern Romania*

**Rezumat:** *Problematica bronzului timpuriu în zonele din răsăritul României comportă încă destule discuții legate de componenta etnică și mai ales de limitele temporale. Cercetările recente dintr-un sit fortificat de pe teritoriul localității Vânători-Neamț au oferit posibilitatea completării tabloului cronologic existent până în prezent pentru prima etapă a epocii bronzului.*

*Chiar dacă situl arheologic amintit a fost investigat printr-o săpătură foarte restrânsă, au putut fi prelevate două probe de os pentru a se obține datări absolute. Analizele s-au făcut în cadrul Institutului Național de Fizică și Inginerie Nucleară "Horia Hulubei", aici fiind prezentate și câteva repere metodologice.*

*Dintre cele două datări, doar una este viabilă, în sensul în care se potrivește specificului materialului arheologic. Astfel, datarea obținută pentru situl de la Vânători-Neamț indică*

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*faptul că la granița dintre milenii III-IV a. Chr. o comunitate specifică grupului cultural Târpești locuia deja în această așezare fortificată.*

**Abstract:** *The topic of Early Bronze Age in the areas within Eastern Romania is still an open matter concerning the ethnic composition and the temporal limits, in particular. Recent research in a fortified site in the territory of the Vânători-Neamț locality provides the possibility of completing the existing chronological picture for the first stage of the Bronze Age.*

*Although a very small excavation enabled the investigation of the archaeological site, two bone samples were obtained for absolute dating. The analyses were performed at "Horia Hulubei" National Institute for Physics and Nuclear Engineering. We present here several methodological landmarks.*

*Out of the two datings, only one is viable; namely, it fits the specifics of archaeological material. Thus, the dating obtained for the site of Vânători-Neamț indicates that, at the crossroads between the 3<sup>rd</sup> and the 4<sup>th</sup> millennium BC, a community of the Târpești cultural group already inhabited this fortified settlement.*

Though there is no unanimous consensus on the beginning of Early Bronze Age east from the Carpathians, there is no doubt that after the end of the Cucuteni culture, a series of alterations take place. They suggest a much different picture than the Eneolithic one.

The most recent contributions indicate that in the area between the Carpathians and the Prut, in the early stages of Bronze Age, several cultural entities existed – some better individualised, other more diffuse, carrying local Eneolithic inheritances or dominated by allogenuous elements from the East and the North<sup>1</sup>.

The localisation of certain archaeological remains corresponding to these cultural manifestations at a well-structured chronological level was possible mainly through the absolute temporal landmarks obtained. Whereas they are scarce, they may represent the basis of historical analysis. Hence, a series of <sup>14</sup>C data were obtained for several funerary complexes<sup>2</sup>, but similar information is available for settlements, too<sup>3</sup>.

To complete the current state-of-the-art regarding the chronology of the Early Bronze Age, we will discuss an absolute dating, recently obtained for a fortification from the sub-Carpathian area of Moldavia, within the Neamț County.

### **The archaeological context**

The archaeological site for which absolute datings were obtained is situated in the territory of the Vânători-Neamț commune, in the northeast of the Neamț County, on the right bank of the river with the same name. Recently identified, the archaeological site is located in a forested area, and it occupies a small cape

<sup>1</sup> DUMITROAIA 2000, p. 101; BURTĂNESCU 2002, p. 155-159.

<sup>2</sup> MIHĂILESCU-BÎRLIBA & SZMYT 2003, p. 105, Tab. 1; POPESCU & BĂJENARU 2007-2008, p. 68, fig. 10.

<sup>3</sup> MANTU 1998, p. 252; LÁSZLÓ 1997, p. 264; LAZAROVICI 2010, p. 83.

(around 1 ha), quasi-triangular from the top view, delimited southward by a ditch most likely with a defence role<sup>4</sup> (**Fig. 1/1-3**).

The presence of this archaeological site at the contact with the mountainous area and at a certain distance from other contemporary sites determines us to consider that it must have had a strategic role: to control a significant access way, namely the upper course of the Neamț river, which would connect with the Bistrița basin and, further, with the intra-Carpathian space.

In the autumn of 2020, a small excavation was performed (16 m<sup>2</sup>) to determine the cultural and chronological classification of the site and clarify the functionality of the anthropic ditch. The defence ditch was sectioned (it had an opening of about 10 m and a maximum depth of 1.5 m; its profile was concave). In the *intra muros* area, a river stone agglomeration was discovered (**Fig. 1/4, 5**), and underneath it, an underground complex (i.e., a small pit, from the filling of which the most consistent archaeological materials were retrieved: ceramic fragments, stone tools and several osteological fragments from animals).

The pit was not identified from the top view; its profile was visible only in the western wall of the S. I section, but the underground complex was well-defined through the different filling and the density of the archaeological materials (**Fig. 2/1**).

From a stratigraphic perspective, underneath the vegetal layer (forest), with a thickness of a maximum of 0.10 m, there was a yellowish, dusty soil identified down to the depth of - 0.40 m. A brown-grey layer followed, with a thickness of 0.10 - 0.15 m, with a concentration of river stones, and underneath it, there was a clayish layer (archaeologically sterile). The pit, featuring asymmetrical walls, was dug into the sterile clayish layer; its upper part was in the brown-grey layer. The filling of the underground complex comprised brown, dense soil (with pebbles, coals, ceramic fragments and lithic items) (**Fig. 2/2**).

A reliable cultural indicator for habitation in this fortified site is represented by ceramics (whereas fragmentary, it allows the reconstruction of vessel details). Average containers with more or less flared rim and a well-profiled body account for most of the discoveries. The decorations are plastic or impressed; they are made of fine, stripped bands, alveolae placed on the rim of the vessels or various impressions (crescent, linear, circular) (**Fig. 3/1-10**).

For the ceramic material found at Vânători-Neamț, we find the best analogies in sites that were ascribed to the Târpești cultural group, specific to Early Bronze in the Moldavian sub-Carpathian area. We remind here the discoveries made at

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<sup>4</sup> DIACONU *et alii* 2021, p. 92-94.

Târpești<sup>5</sup>, Izvoare<sup>6</sup>, Bodești<sup>7</sup>, Țolici<sup>8</sup> and Văratec<sup>9</sup>, but similar remains are also attested in the Suceava Plateau<sup>10</sup>.

### Material and method

From the site of Vânători-Neamț, two bone specimens were sampled to obtain absolute datings. Both come from the *intra muros* area, from the filling of the underground complex (Pit no. 1). A first specimen (RoAMS - 1746.89) was sampled at a depth of - 0.40 m compared to the current soil level; from an archaeological context corresponding to the river stone pile (on the upper part of the Pit no.1). The second specimen (RoAMS - 1747.89) was sampled from the filling of the pit at a depth of - 0.60 m, from a level with brown soil that includes ceramic fragments and coals.

From a methodological perspective, the two samples were introduced in the RoAMS laboratory, where collagen was extracted from the osteological remains. The extraction process includes five stages<sup>11</sup>.

The first step was to clean the samples in an ultrasonic bath with ultrapure MilliQ water and then the samples was dried for 4 hours in oven at 60°C and then ground using a grinder mill.

In the second stage, demineralization, 3.0 – 3.5 g of the samples was treated with 15 mL solution 0.5 M HCl at room temperature for 30 minutes.

The precipitate was separated via centrifugation; the solution was removed, and the sample was washed using ultra-pure water (up to neutral pH).

In the third stage (of gelatinisation), the samples was treated with 20 mL solution 0.2 M HCl overnight at a temperature of 80°C and 450 rpm.

The filtration of collagen using the Amicon Ultra Filter 30kDa filter, its recovery from the filter and its freezing represented the fourth stage. The last stage is collagen lyophilisation overnight at - 45°C, for 16-18 hours.

To obtain a sufficient amount of CO<sub>2</sub> required for AMS analysis, an amount of approximately 3.0-3.5 mg of lyophilized collagen was weighed into a special tin capsule, which was subsequently introduced into the Elemental Analyzer (EA, varioMicro Cube, Elementary, Germany).

Using the Automated Graphitization Equipment AGE 3 (ETH Zurich, Switzerland), pure CO<sub>2</sub> obtained by sample combustion in the elemental analyser is absorbed in a zeolite trap and released through thermal expansion in an iron-based AGE reactor. CO<sub>2</sub> is converted into graphite in the presence of temperature and hydrogen, finally obtaining a homogeneous mixture of carbon and iron. The entire graphitization process is controlled by a computer and by the LabVIEW

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<sup>5</sup> MARINESCU-BÎLCU 1981; BURTĂNESCU 2002.

<sup>6</sup> VULPE 1957, fig. 276-283.

<sup>7</sup> MUNTEANU 2018, pl. 12-20.

<sup>8</sup> DIACONU & GARVĂN 2010, fig. 2-6.

<sup>9</sup> DIACONU 2016, fig. 82/8-10.

<sup>10</sup> NICULICĂ 2015, p. 101-109, pl. 15-29.

<sup>11</sup> HAJDAS *et alii* 2009, p. 675-680.

software<sup>12</sup>. At the end the homogeneous mixture contains approximately 1 mg C and 5 mg Fe and then it is pressed into an aluminium cathode and placed in the ion source of carousel from the 1 MV Tandatron™ accelerator (Fig. 4/1).

The RoAMS laboratory from the "Horia Hulubei" National Institute for Physics and Nuclear Engineering of Măgurele-Bucharest is based on a 1 MV Tandatron™ particle accelerator, manufactured by the High Voltage Engineering Europa-HVEE company<sup>13</sup>.

The installation comprises two negative ion sources, the electrostatic deflector for commuting the negative ion beam from one source to another, the 90° magnetic analyser on the low energy side, the Cockcroft-Walton acceleration system, the second 90° magnetic analyser on the high energy side, an 120° electrostatic analyser and, finally, the detection system, an gas ionisation chamber E/ΔE type.

All the samples and the reference materials were measured for 50 minutes. Namely, ten individual measurements were divided in ten blocks of 30 seconds each. The standards used during the measurements were oxalic acid II (OXII<sup>14</sup>) as a modern material and anthracite coal to determine the background level.

### Findings

Based on the specimens analysed, we obtained two datings featured below:

Specimen code	Material	δ 13C (‰)	Conventional Radiocarbon age and error	2σ calibration results (95.4 %)
RoAMS - 1746.89	bone	227.4	2576 (78)	Probability of 3.1 %: 898-863 calBC Probability of 91.1 %: 847-462 calBC Probability of 1.2 %: 438-421 calBC
RoAMS 1747.89	bone	- 28.0	4350 (41)	Probability of 9.4 %: 3092-3052 calBC Probability of 86.1: 3039-2892 calBC

Given that in the Vânători-Neamț site, only archaeological remains specific to Bronze Age were found, the sample RoAMS - 1746.89 is not included in the chronological interval of the stage mentioned above. On the other hand, the second sample – RoAMS - 1747.89 – provides a reliable temporal reference for

<sup>12</sup> WACKER *et alii* 2010, p. 931-934.

<sup>13</sup> STAN-SION *et alii* 2014, p. 117-122.

<sup>14</sup> 4990C NS. International Standard Reference Material for Contemporary Carbon-14, NIST: USA.

what archaeological literature has defined as the Early Bronze Age, namely the late 3rd millennium BC (**Fig. 4/2**).

As we have stated in the first part of this paper, for the eastern area of Romania, there are few absolute datings for the beginning of the Bronze Age. We also add that there are no complex data series available for one or more sites. Many of the absolute chronology references available at the moment belong to funerary contexts. However, only a few of them are related to settlements - this limits the possibility of setting timeframes for the habitation of various spaces.

Without listing here all known C14 data for Eastern Romania, it is worth highlighting that similar chronological references to the dating of Vânători-Neamț are encountered for the tombs belonging to the Globular Amphorae Culture in Bârgăoani (Neamț County;  $2\sigma$  Cal. 3265-3242 (1.1%), 3105-2862 (91.4%), 2808-2757 (2.5%), 2718-2708 (0.3%)) and Basarabi (Suceava County;  $2\sigma$  Cal. 3326-3231 (9.6%), 3224-3220 (0.3%), 3175-3170 (1.1%), 3120-2888 (84.4%)), and in the Horodișteea settlement (Botoșani County;  $2\sigma$  Cal. 3084-3065 (6.5%), 3028-2916 (88.9%)). Based on the information above, it may be assumed that at a certain point in time, the community of Vânători-Neamț was contemporary with human groups within the Globular Amphorae Culture, as well as with populations of the Horodișteea area.

Until recently, the Târpești cultural group has not benefitted from absolute datings, but by corroborating the chronological landmarks obtained for the site of Bodești-Cetățuia *Frumușica* with those for Vânători-Neamț, it may be concluded that the existence of this cultural entity spanned across four centuries.

### **Brief conclusions**

Whereas there is no complex dating series for the site of Vânători-Neamț, the information obtained is relevant because it completes the chronological picture of the Early Bronze phenomena east from the Carpathians. Two decades ago, Fl. Burtănescu determined a possible synchronism between finds belonging to the Globular Amphorae Culture and those of the Târpești group, which has proven to be accurate now, given the absolute datings known for the two cultural settings. The same author argued that for the Târpești group, one could consider an internal periodization, which he suggested at that point only based on the ceramic material. In the site of Izvoare, several archaic elements were found, but in the eponymous settlement, researchers identified later features of this cultural manifestation. Furthermore, the absolute datings of Bodești and Vânători-Neamț corroborated with the specifics of the ceramic material within the two sites confirm – to a certain extent – the existence of distinct evolutive moments concerning the Târpești cultural group.

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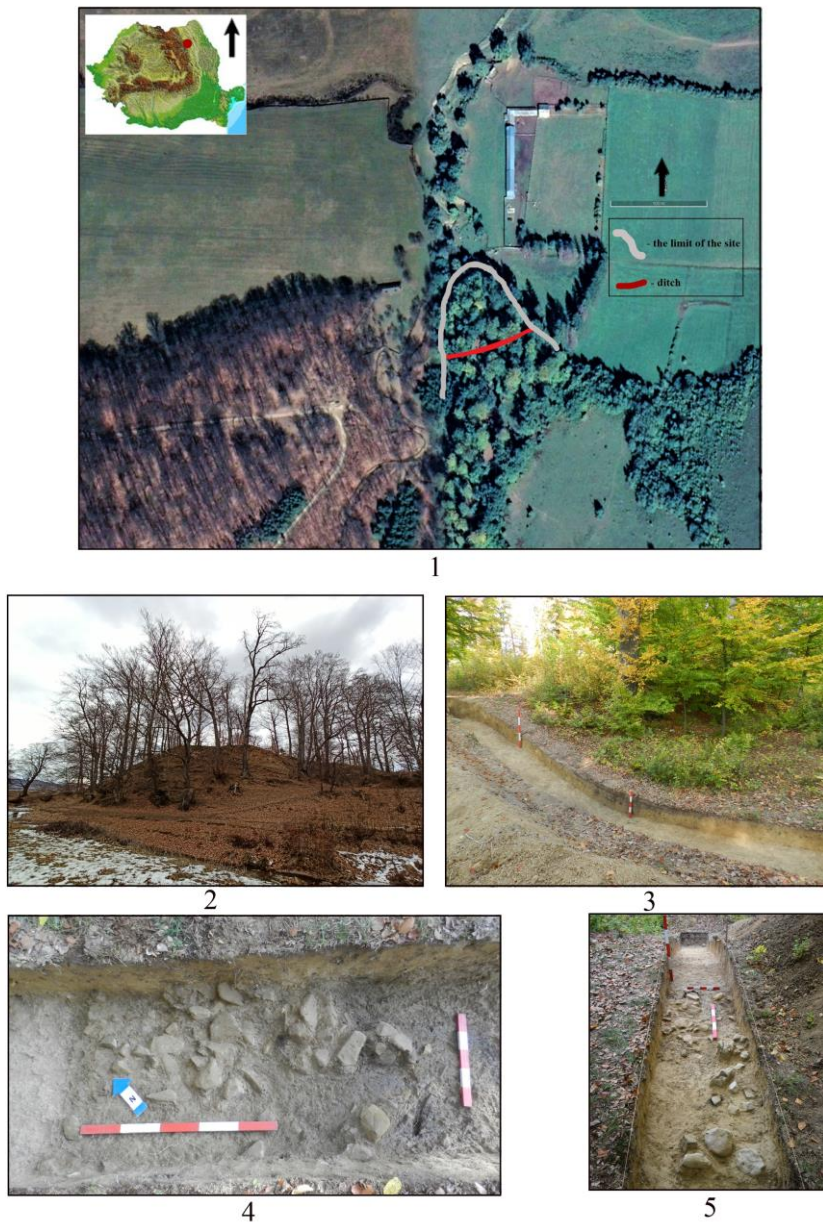


Fig. 1 - The fortified site from Vânători-Neamț; 1 - orthophoto map; 2 - view from the northwest; 3 - section of the defensive ditch; 4, 5 - stones structure.

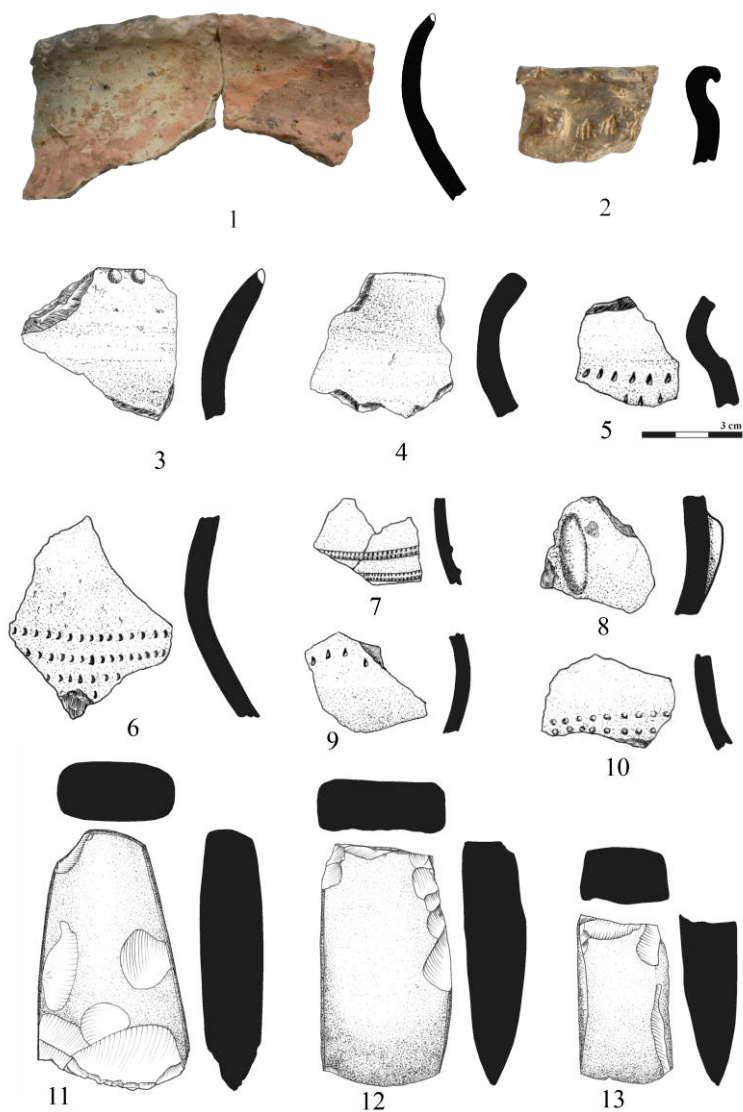
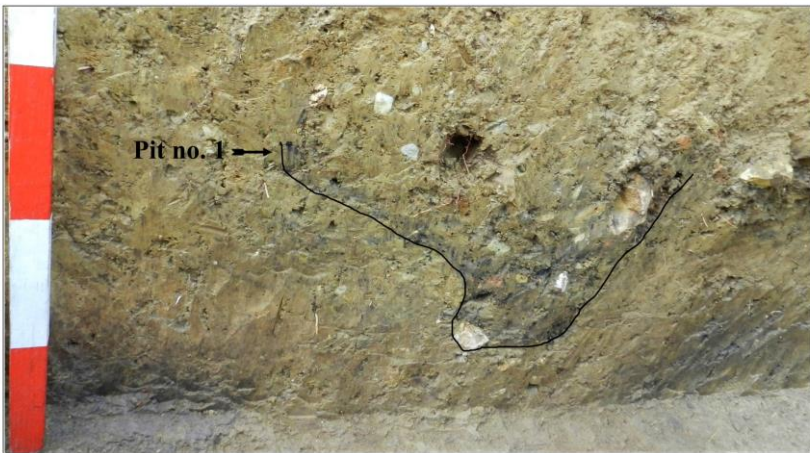


Fig. 2 - Archeological materials from the site of Vânători-Neamț.

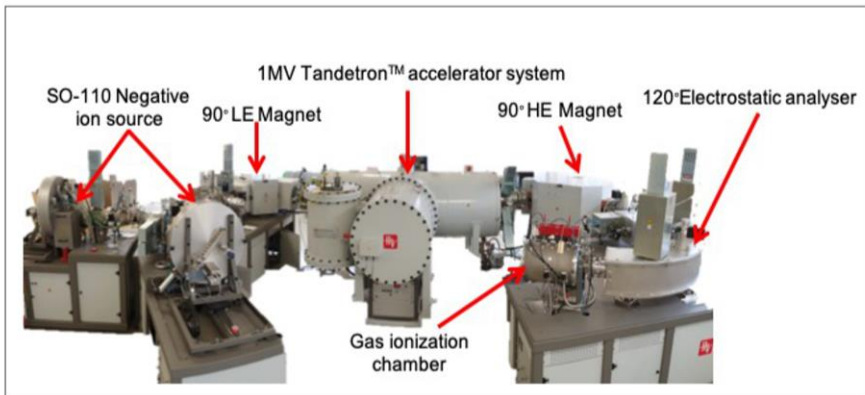


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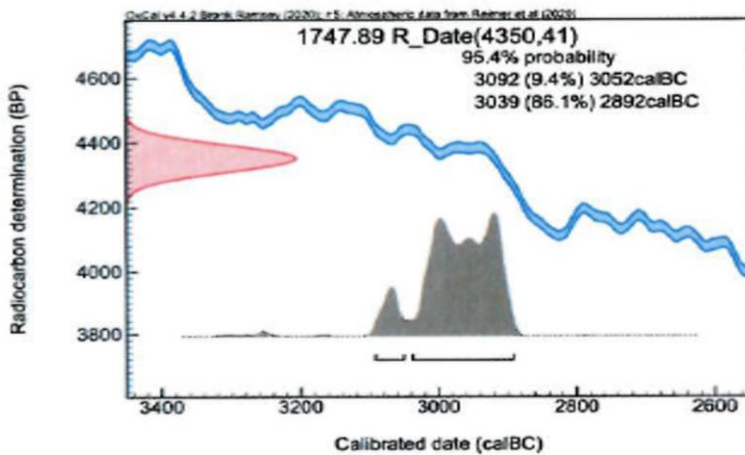


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**Fig. 3 - The pit no.1: 1, 2, stratigraphic details.**



1



2

Fig. 4 - 1 MV Tandatron™ accelerator system (1);  
absolute dating of the sample no. 1747.89 (2).