

An eneolithic length measurement unit. The *Pian*.

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Abstract: The preventive researches on the route of the A1 Motorway, on the Orăștie - Sebeș section, the group no. 1, have occasioned the continuation of the investigations, after more than four decades, on the site from Pianu de Jos Podei (Alba County). The defensive system includes a series of counterforts for additional attachment of one of the palisades. The seven small foundation trenches of these counterforts are located each other at distances that – measured from the center of the excavations – can indicate the existence of a unit of measure. Mathematical calculations have indicated that ~ 0.44 m is the unit of measure sought. Although it recalls the biblical elbow – 44.96 cm (originally) / 44.45 cm (later), and the Roman one – 44.40 cm, we will call it **pian** (pl. piani) because it is still older than mentioned.

Rezumat: Cercetările preventive de pe traseul autostrăzii A1, pe tronsonul Orăștie - Sebeș, lotul 1, au prilejuit reluarea investigațiilor, după mai bine de patru decenii, în situl de la Pianu de Jos Podei (jud. Alba). Sistemul defensiv include o serie de contraforți pentru fixarea suplimentară a uneia dintre palisade. Cele șapte mici șanțuri de fundație ale acestor contraforți sunt amplasate, unul față de celălalt, la distanțe care – măsurate din centrul excavațiilor – pot indica existența unei unități de măsură. Calcule matematice au indicat că valoarea de ~ 0,44 m este unitatea de măsură căutată. Deși amintește de cotul biblic – 44,96 cm (inițial) / 44,45 cm (ulterior), și de cel roman – 44,40 cm, o vom denumi **pian** (pl. piani) pentru că este totuși mai veche decât cele menționate.

Keywords: fortified settlement, the Foeni-Petrești group, length measurement unit, chronology.

Cuvinte cheie: așezare fortificată, grupul Foeni-Petrești, unitate de măsură de lungime, cronologie.

The preventive researches on the route of the A1 Motorway, on the Orăștie - Sebeș section, the group no. 1, have occasioned the continuation of the investigations, after¹ more than four decades, on the site from Pianu de Jos Podei (Alba County) (fig. 1-2). Our researches from 2012 have investigated about 8700 m², the stratigraphical control exerted on about 1.50 northern hectares of among 14 of Podei area (fig. 3).

Because of the research results have been widely published (C. Bem 2015a), we only present here, in short, the *defensive* structure system.

Developed by a Foeni-Petrești community (C. Bem 2015b; V. Opreș et alii 2015), the access blocking system, from the Mureș valley, had two main components – successive lines of *fortification* (fig. 3) with implanted wood elements and a *defensive* ditch in the eastern area of the investigated zone. The ditch is the only open element, subsequently filled naturally.

By *defensive line I* mainly indicated the coherent group of foundation ditches for palisades. Chromatically individualized in figure 3, they strategically leans on the *defensive* ditch in the eastern area, unfolding in the central space of the plateau and complementing each other, generally ending before the western slopes rise. Exception makes the last line, whose route changes steeply, becoming perpendicular to the inhabited area.

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¹ In 1961-1963 and 1967, the site have been researched systematically. Then have been identified Vinča (Turdaș), Petrești and from the Bronze Age – Coțofeni habitations (I. Paul 1969; *idem* 1992).

To each one there are corresponding, more or less easy to assign, additional attributes – implantation pits (individual, double or, rarely, multiple), as well as foundation ditches, slightly deep and narrow to the mouth. They are complemented by a series of excavation works – large but slightly deep, especially located in the area of the *gates* and continued, sometimes, through pits for implantation.

The second *defensive line* (fig. 3) consists of two pairs of quasi-parallel trenches for the foundation of the palisades. The ends from the inside, which delimit the single access path (*gate 2*), being firmly dug – having the transversal wall almost vertically – and arranged in zigzag. Not only the access zone, but also the spaces between the palisade pairs, especially the west area, are additional *fortified*.

It is the most important in size, excavation works, tactical elements and social energy spent. Not only takes over, probable, from the elements of the first *defensive line*, which partially disables it, but eliminates the route's and excavation errors.

The exterior palisades are ending, progressively losing from depth and width, in areas that became very little *vulnerable*, as was the case with first line counterparts. However, their pairs firmly lock the whole space, blocking access². Cx74 (which continues outside the investigated area) – in its western third, after finishing of the Cx62 palisade, it has a supplementary reinforcement structure, through seven *counterforts* made of wooden structures implanted in tight and deep ditches perpendicular to its route (fig. 3-4), but not at the same time³ with the palisade (fig. 5/4). They have the general form V, very elongated, the walls, without being vertical, are very steep. The logos – from 74a to 74g – go from North to South (fig. 4).

The lengths, calculated at the top, are those shown in the table. Dimensions are rounded lower or higher at the third decimal. However, must consider that an error, even if acceptable, must have existed. Always, the depth they reach is between 0.65 and 0.90 m from the bottom of the main palisade ditch (Cx74), the two range limits actually representing the dimensions itself. The widths of all – in the area where they are further deepened – are placed around 0.45 m (fig. 5/1-5). The width at the top, more difficult to reconstitute accurately⁴ because of physical factors that occurred during archaeological research, are also indicated in the table below.

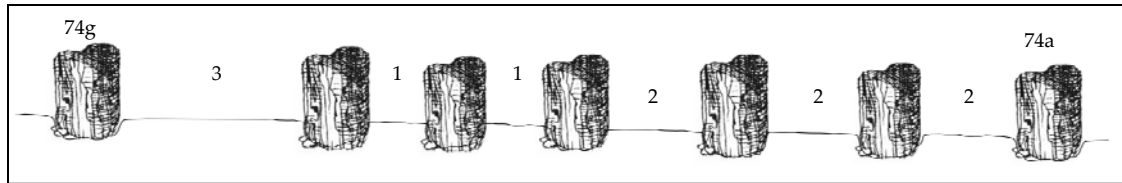
| | 74a | 74b | 74c | 74d | 74e | 74f | 74g |
|--------------------|------|------|------|------|------|------|------|
| Maximum length (m) | 3.11 | 3.50 | 1.98 | 2.43 | 2.31 | 2.21 | 2.90 |
| Maximum width (m) | 1.30 | 0.95 | 0.70 | 0.75 | 0.70 | 0.70 | 0.85 |

² We don't use the terms like *obstruction*, *access*, *vulnerability* etc. from the point of view of defensive / offensive issues.

³ No stratigraphical element have indicated something else. The seven trenches have been individualized very well, the filling being different as against of the main palisade trench – chromatic but also from the texture and composition point of view. Therefore, have been digged and erected the palisades supports at a stratigraphically moment subsequent to the main palisade's construction.

⁴ Only in the sense of rounding of "0" or "5" for the second decimal and elimination of the digging accidents's [for example, the *counterfort* no. 74b (of S19), due to the removal action of the bulk S17/S19 who have broken the higher part of the buttress].

The ditches of foundation of the *counterforts* are located each other at distances that – measured from the center of the excavations – can indicate the existence of a unit of measure. To simplify, we identified each distance by one code. It was obvious that the difference between 1 and 2 is sensibly equal to the difference between 2 and 3 and is equal to a value that is placed around 2.20 m. If it had entered each of the distances by a whole number of times (in a strictly mathematical sense), it would undoubtedly have constituted a unit of measure.



(the schematic correspondent of figure 4)
(correspondentul schematic al figurii 4)

$$1 = 1.4 \times 2.20 \text{ m (3.08 m)}$$

$$2 = 2.4 \times 2.20 \text{ m (5.28 m)}$$

$$3 = 3.4 \times 2.20 \text{ m (7.48 m)}$$

$$3.08 - (2.20) \times 1 = 0.88$$

$$5.28 - (2.20) \times 2 = 0.88$$

$$7.48 - (2.20) \times 3 = 0.88$$

In other words, if it were a common divisor for the three distances, it would have represented a unit of measure. Because this does not happen, but is present at the three distances, the value of ~ 2.20 m represents a multiple of that unit of measure.

The constant difference resulting from the removal of the quantum of 2.20 or its multiples (in turn, of course, multiples of the unit of measure sought) is ~ 0.88 m. For this value to represent the unit of measurement, it should be divided by one integer number the 2.20 value. However, the ratio between the identified standard distance and the constant difference is 2.5. Which means that both values are multiples of the unit of measurement, the biggest common divisor (except for the "1" for obvious reasons) being 0.44.

The value of ~ 0.44 m is the unit of measure we are looking for. Although it reminds us of the biblical elbow of measure – 44.96 cm (originally) / 44.45 cm (later) and the Roman one – 44.40 cm, we will call it a *pian* (pl. *piani*) because it is older than mentioned. The multiple of which started our reasoning (~ 2.20 m) – somewhat like the *fathom* – has five *piani*. In the same way, the lengths and widths above can be transformed, like the other dimensional elements mentioned, as well as any other:

| | 74a | 74b | 74c | 74d | 74e | 74f | 74g |
|---------------------------------|-----|-----|------|------|------|------|------|
| Maximum length (<i>piani</i>) | ~7 | ~8 | ~4.5 | 5.5 | 5.25 | ~5 | ~6.5 |
| Maximum width (<i>piani</i>) | ~3 | ~2 | ~1.5 | ~1.5 | ~1.5 | ~1.5 | ~2 |

The fact that a fraction⁵ of the unit of measurement appears may indicate the plausible existence of a submultiple ~ 0.22 m.

⁵ Fraction of 1/4 regarding the maximum length of the *counterfort* no. 74e can be due of physical errors of the archaeological diggings itself.

All the *counterforts* had posts fixed by pressure in the filler, their number ranging between five and eight, depending on the length of the foundation ditch. Rarely (fig. 5/1-5), the emplacement was eccentric, not on the bottom of the trench. The diameters were between 6.50 and 14.50 cm. Most likely, as we said, they were supporting a palisade designed to fix additional the main one.

The *defensive* assembly can be dated, based on the modeling of four radiocarbon data, somewhere in the mid-5th millennium BC (C. Bem 2015b).

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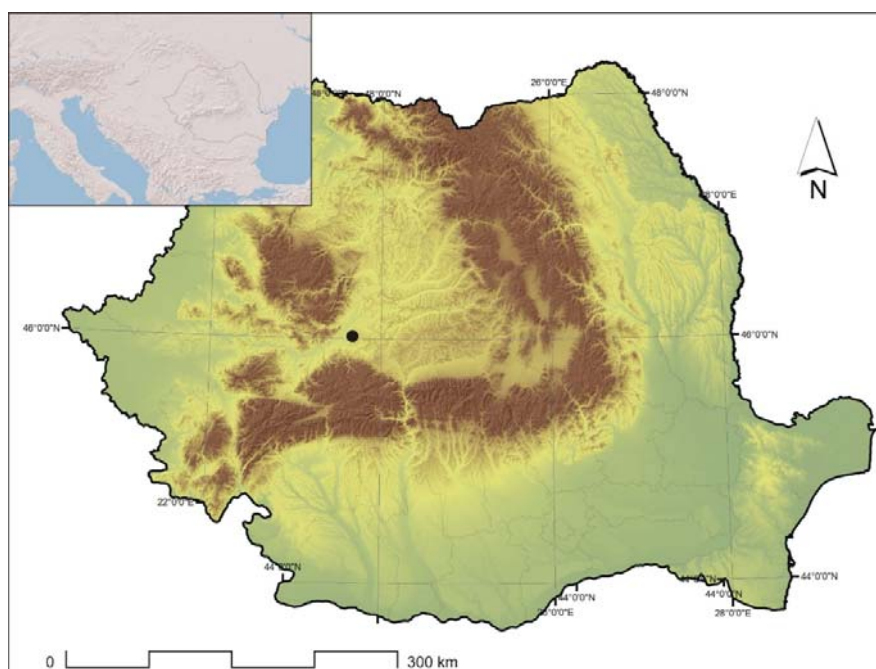


Fig. 1. The location of the Pianu de Jos zone.
Localizarea zonei Pianu de Jos.

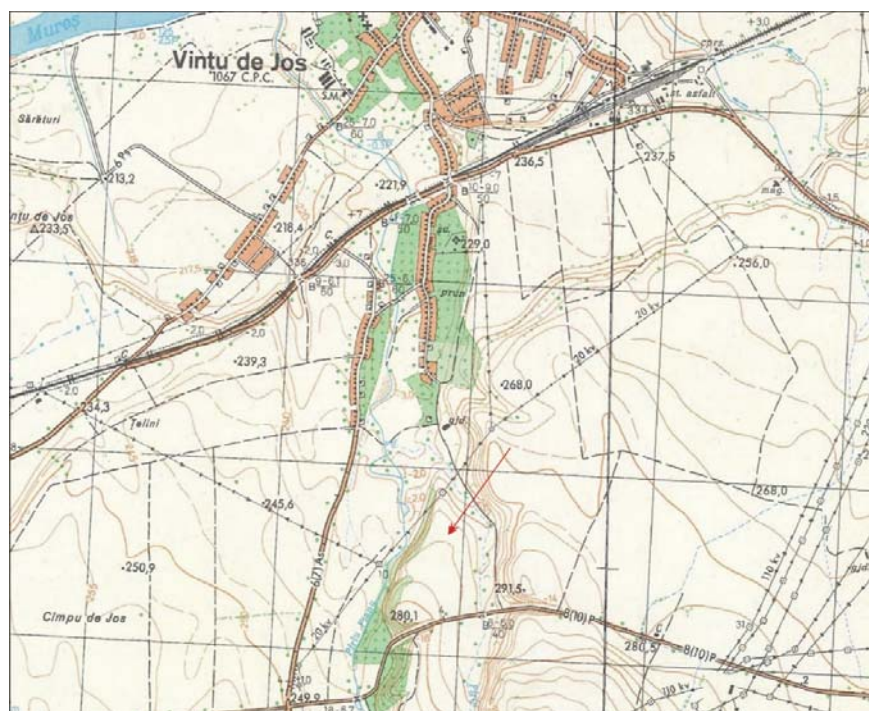


Fig. 2. Cartographic detail of the zone of the Pianu de Jos *Podei* settlement.
Detaliu cartografic al zonei aşezării de la Pianu de Jos *Podei*.

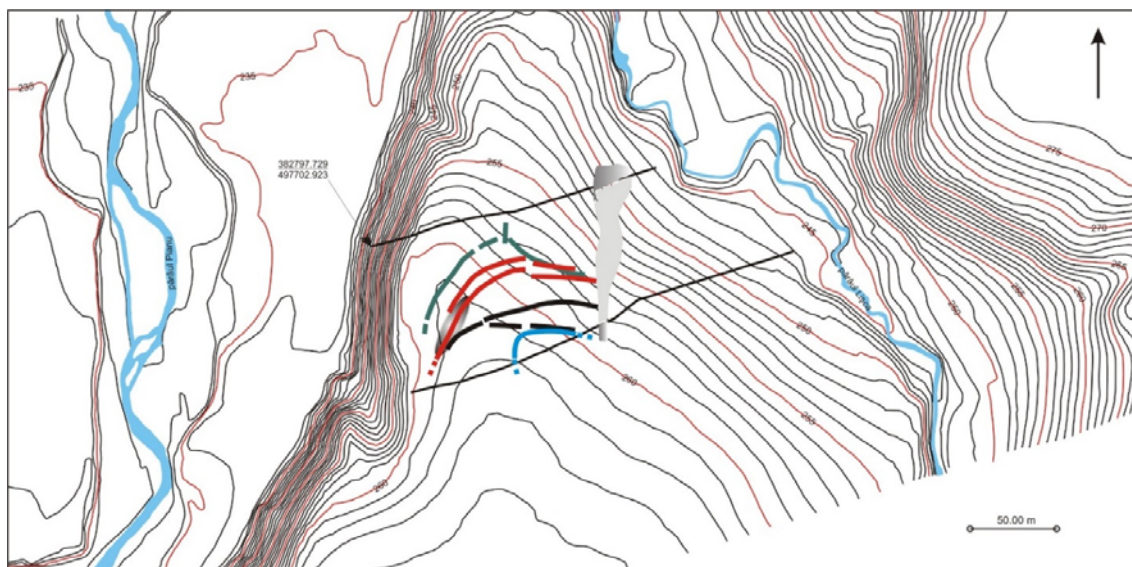


Fig. 3. Pianu de Jos *Podei*. The topographical situation of the foundation ditches for palisades and of the eastern ditch. The shaded zone indicates the emplacement of the *counterforts*.
 Pianu de Jos *Podei*. Situația topografică a șanțurilor de fundație pentru palisade și a șanțului estic. Zona hașurată indică amplasamentul *contraforților*.

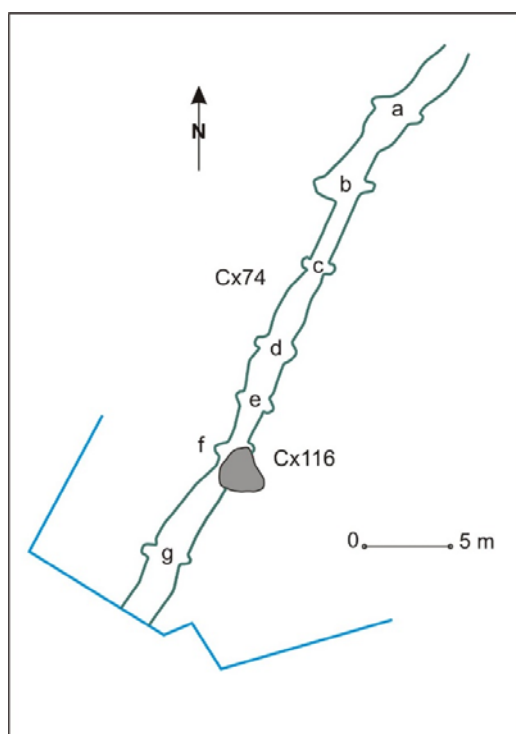


Fig. 4. The partial route of the second *defensive* line (here only Cx74) and the location of the *counterforts* (the line to the bottom mark the margin of the researched area; Cx116 represents a pit from the bronze age – Coțofeni).

Traseul parțial al celei de-a doua linii *defensive* (aici doar Cx74) și amplasamentul *contraforților* (linia de jos marchează marginea suprafeței cercetate; Cx116 reprezintă o groapă din epoca bronzului – Coțofeni).

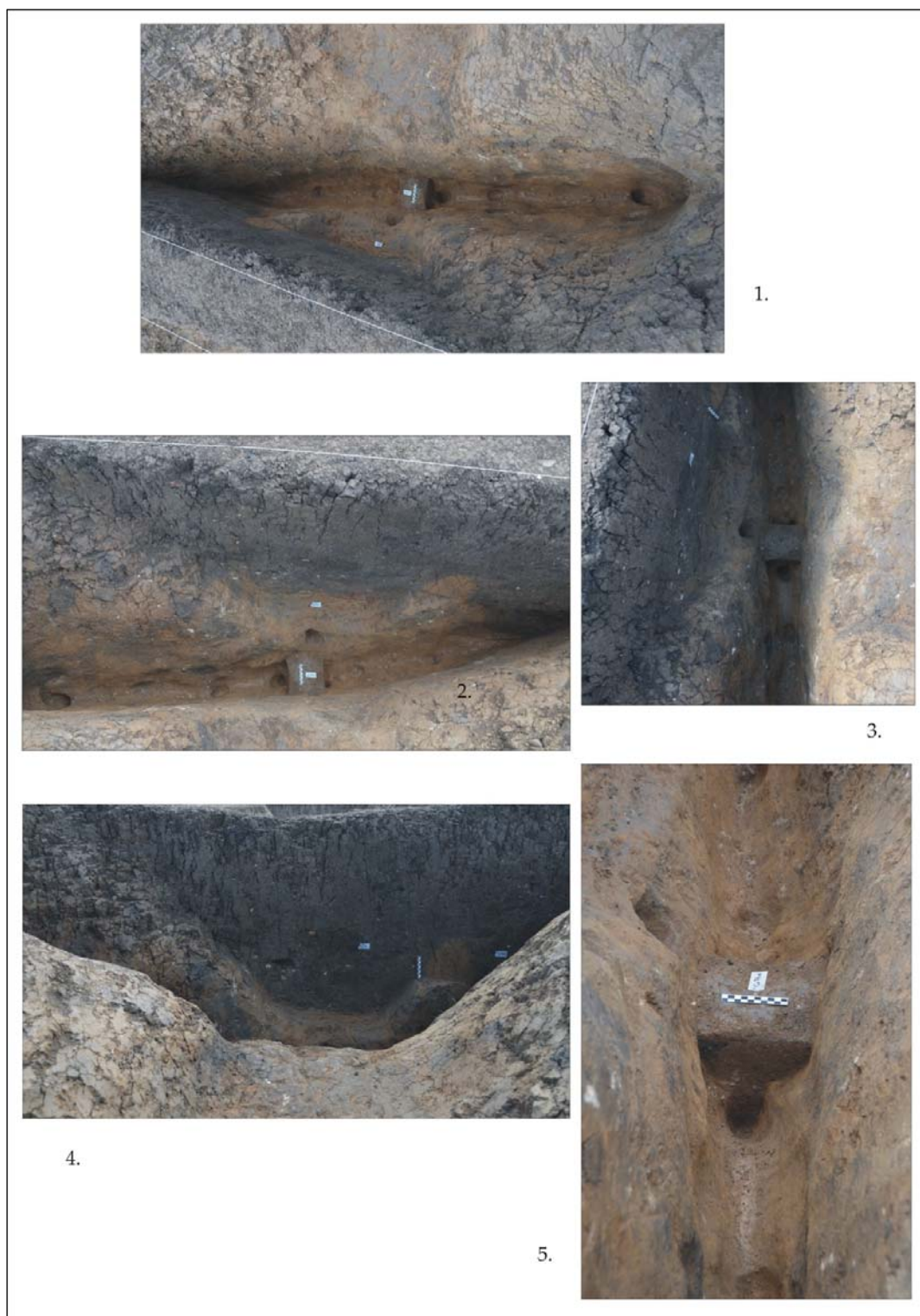


Fig. 5. Pianu de Jos *Podei*. Photos of the second *defensive* line. Cx74 – counterfort 74a.
Pianu de Jos *Podei*. Fotografii ale celei de a doua linii *defensive*. Cx74 – contrafortul 74a.