

AGAIN ABOUT THE FOUNDING DATE OF THE FORTRESS AT PĂCUIUL LUI SOARE

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Keywords: *Byzantine Empire, John I Tzimiskes, Păcuiul lui Soare, fortress, a fundamentis, radiocarbon dating.*

Cuvinte-cheie: *Imperiul bizantin, Ioan I Tzimiskes, Păcuiul lui Soare, cetate, a fundamentis, datare radiocarbon.*

Abstract: *This contribution is prompted by the execution of a radiocarbon dating related to the archaeological site from the Middle Byzantine period on the island of Păcuiul lui Soare, which has been under investigation since 1956. The chronological framing also allows the (inevitably polemical) discussion of various viewpoints regarding the construction of the island fortress, either in the Roman/Roman-Byzantine era or during the period of the First Bulgarian State. The new theories can be contradicted by the old arguments, drawn from the specialized literature, concerning the construction of this fortification a fundamentis in the Middle Byzantine period, supported by multidisciplinary investigations, such as radiocarbon dating.*

Rezumat: *Contribuția de față a fost determinată de realizarea unor datări radiocarbon, referitoare la situl arheologic aparținând epocii medio-bizantine din insula Păcuiul lui Soare, cercetat începând din anul 1956. Încadrarea cronologică prilejuiește și abordarea (inevitabil polemică) a discuției privind exprimarea/reiterarea unor puncte de vedere despre edificarea, în epoca romană/romano-bizantină sau în perioada primului Țarat bulgar, a cetății*

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insulare. Noile teorii pot fi contrazise cu vechile argumente, preluate din literatura de specialitate, privind construirea acestei fortificații a fundamentis în perioada medio-bizantină, susținută de investigațiile pluridisciplinare, precum datarea radiocarbon.

An archaeological research project, initiated in 1956 by a team of Romanian archaeologists, coordinated by Petre Diaconu and continued until the second decade of the current millennium¹, led to the discovery and study of a fortification at the northeastern end of the Danube Island Păcuiul lui Soare. This island is located in the southwestern corner of Dobruja, about 12 km from Ostrov (Constanța County) and 20 km upstream from Silistra, splitting the waters of the Danube from the village of Ostrov to the front of Dervent hill.

The fortress, which likely had a trapezoidal or rectangular shape² and covered an area of approximately 4–5 hectares (of which only a part can be seen today³, as the western area has been destroyed by the Danube waters), was considered by the authors of the systematic research⁴ to be a naval base for the Byzantine fleet⁵ (Fig. 1).

Data regarding the fortification⁶

The preserved portion of the Byzantine island fortress is bordered on the northeast side by an **enclosure wall**, visible for a length of 42 m, and on the southeast

¹ NESTOR, DIACONU 1959; DIACONU 1959; DIACONU 1961; DIACONU, POPA, ANGHELESCU 1962; POPA 1964; DIACONU 1966; DIACONU 1969; DIACONU 1971; DIACONU, VÎLCEANU 1972; DIACONU 1976a; DIACONU, BARASCHI 1977; BARASCHI 1987; DIACONU, CĂPĂȚÂNĂ 1988–1989; DIACONU 2000; DIACONU 2001; DIACONU, DAMIAN, VASILE 2001; DIACONU *et alii* 2003; DIACONU *et alii* 2004; DAMIAN 2005, p. 150–157; DAMIAN *et alii* 2007; DAMIAN *et alii* 2008; DAMIAN *et alii* 2013; DAMIAN 2020; DAMIAN 2021, p. 110–114, fig. 3–11, p. 120–121, fig. 25–29.

² DIACONU 1972, p. 47 and note 1.

³ POPA 1964, p. 108 (one third); DIACONU 1969, p. 398; DIACONU 1971, p. 3 (one fifth); DIACONU 1972, p. 12, note 12 (one third/one fourth/one sixth).

⁴ See *supra* note 1.

⁵ For the role of a naval base held by the Byzantine fleet's fortification at Păcuiul lui Soare, see: NESTOR, DIACONU 1959, p. 588; DIACONU 1959; DIACONU, POPA, ANGHELESCU 1962, p. 713–716; VÎLCEANU 1963, p. 207–208; POPA 1964, p. 107; DIACONU 1965, p. 13; VÎLCEANU 1965, p. 291; DIACONU 1966, p. 368; POPA 1967, p. 271; DIACONU 1969, p. 398–400; POPA 1970, p. 569; DIACONU 1971, p. 5; DIACONU 1972, p. 24–25; DIACONU 1976a, p. 412; DIACONU 1976b, p. 940; DIACONU 1985; DAMIAN 2015, p. 230 and note 165. The citadel, in its primary form and initial function, lasted for a short time (DIACONU 1959, p. 654–656; DIACONU 1961, p. 602; DIACONU 1972, p. 51), from its construction, during the reign of John I Tzimiskes, until its probable decommissioning during the Bulgarian revolt. The Byzantine reconquest of northeastern Bulgaria and Dobruja in 1001 marked the settlement's transition to a guarded community by *stratiotai* (DIACONU 1969, p. 400).

⁶ DIACONU 1961, p. 599–600; VÎLCEANU 1965; DIACONU 1966, p. 366–367; VÎLCEANU 1967, p. 593–605; DIACONU 1969, p. 398–399; POPA 1972, p. 27–29; DIACONU 1972, p. 36–38, 43, 45–51, 55–57; DIACONU, CĂPĂȚÂNĂ 1988–1989, p. 153, fig. 1/B; DIACONU, DAMIAN, VASILE 2001; DIACONU *et alii* 2003; DIACONU *et alii* 2004; DAMIAN *et alii* 2007; DAMIAN *et alii* 2008; DAMIAN *et alii* 2013; DAMIAN 2020, p. 272–277; DAMIAN 2021, p. 110–114, fig. 3–11, p. 120–121, fig. 25–29. Between 2000 and 2012, archaeological research was conducted to uncover elements of the construction system of the island fortification, with the aim of developing an architectural study to serve as the foundation for a conservation and enhancement project of the Byzantine monument.

side by another wall measuring 240 m in length, which includes a gate-tower and a port. The curtain wall, preserved to a height of 5–6 m and with a width ranging between 4.20 m and 6 m, was built using a system of steps (*crepidae*) arranged vertically on both faces of the wall in its lower half. It was constructed in the “block-work” system with facings made of large, parallelepiped-shaped blocks, carefully fashioned and bonded with mortar composed of lime, sand, and river gravel, with the addition of crushed brick (waterproof mortar) to fill the joints. The core of the wall consisted of irregularly shaped or parallelepiped blocks, forming a compact mass of masonry, created by layering horizontal planes of stones bonded with mortar (**Fig. 2**). Given the sedimentary nature of the soil in which the foundations were to be laid, composed mainly of alluvial sand and at greater depths of dark bluish mud, the builders of the fortress opted to ensure the stability of the walls through a **wooden substructure**. This was identified in the area of the eastern wall’s exterior facing, at the northeast corner of the gate tower’s platform, at the junction area of the eastern curtain wall with the northern tower of the wharf, and in the southern sector. This substructure was composed of vertically placed oak piles, over which oak beams were laid in certain places, arranged longitudinally and transversely. Among the fortified exterior complexes, the **gate, towers, and port installation** are of the greatest interest. The **gate**, situated on the northeast side, appears in the form of a rectangular tower (14.70 × 10.50 m), paved with large stone slabs. It represents, in fact, a platform-foundation, with one or two stories and two entrances (an exterior one, of the cataract type, and a second, interior one, arranged within the thickness of the curtain wall, equipped with two leaves blocked by a wooden bar, whose ends entered niches arranged on the sides of the gate; in this area, the “beginnings” of a vault made of stone blocks have been preserved). Access to the upper floor was made via stone steps built into the curtain wall to the west of the gate (**Fig. 3**). The existence of another gate on the southern side of the fortress cannot be excluded. Other fortification elements include a tower with a semicircular side and a straight side, designed to form an obtuse angle with the curtain wall, meant to serve as an obstacle against the waters and especially the ice, ensuring their smooth sliding. There is also a semicircular stone tower located west of the fortress’s main gate, the only one of its kind documented so far at Păcuiul lui Soare. The **port installation (wharf)**, located on the southeastern side of the fortress (since at the time of its construction, the navigable part of the Danube consisted of the Ostrov branch), is a 24-meter-long construction complex. It is represented by a series of stone platforms resembling a monumental staircase descending toward the water in steps, flanked by two rectangular towers and featuring an impressive entrance to the fortress, 4 m wide, with a gate made of two wooden leaves plated with iron. Both to the right and left of this entrance, within the width of the curtain wall, three openings (slots) were

During the 2000–2003 campaigns, the north gate and the southern sector of the fortress (which is usually submerged by the Danube waters) were investigated. In the 2004–2005 and 2007 campaigns, the northern part of the port installation with the adjacent tower was uncovered, and the connection between the eastern curtain wall and the northern tower wall of the port installation was explored. From 2006 to 2012, efforts focused on uncovering the southern part of the wharf and its entrance, investigating the southern tower that flanks it, which was only partially explored in the 1960s, and identifying the boundaries of the fortress in the southeastern corner.

arranged on each side, likely used for ropes to moor the ships (Fig. 4). Due to the sedimentation of sand, particularly in the last 200 years, possible annexes (berths, docks) are now covered by it. Opposite the port installations, inside the fortress, the ruins of a large building with an apse have been uncovered. Its southwest orientation and the absence of Christian vestiges led to the conclusion that it was not a place of worship; its purpose was likely related to the functioning of the wharf.

Data on the wooden substructure of the fortress⁷

Identified at multiple points through sections in the area of the curtain and fortification elements, but documented on the surface only in the southern sector of the fortification (Fig. 5), the wooden substructure represents an elaborate pile foundation system for the enclosure wall. The foundation was achieved both through oak stakes placed vertically (at small distances, in the bluish silt of the island, and fixed with small stones, overlaid with a layer of mortar on which the masonry blocks were placed), and through a network of oak beams arranged horizontally on two levels (at a distance of about 0.30–0.40 m, with vertical stakes with a circular cross-section inserted into rectangular holes, in a dowel system), between which hydraulic mortar was poured, overlaid with a mortar slab from which the enclosure wall itself was raised, currently destroyed by the Danube waters in the respective area (Fig. 6–7).

The wooden substructure of the fortress in the southern sector represents **the source of the sample extracted in 2021 and analysed in 2022 through radiocarbon dating⁸**. The chronological framing of this wooden substructure can implicitly ensure the dating of the moment of the fortification's construction.

Archaeological and historical data on the site of Păcuiul lui Soare. Issues of chronological and cultural classification

The fortress on the island of Păcuiul lui Soare was considered to have been built *a fundamentis* by the Byzantine Empire in the last quarter of the 10th century (shortly after 971, the moment of the confrontations between the troops of Emperor John I Tzimiskes and the Kievan forces under the leadership of Prince Sviatoslav, when the Constantinopolitan administration was reinstated at the Lower Danube and the region was transformed into a Byzantine province, known in literary sources as the theme Paristrion or Paradounavon, with its capital at Dorostolon or Dristra,

⁷ In this regard, we wish to draw attention not only to the constructive role of the wooden substructure of the fortress (VÎLCEANU 1965, p. 291–305; DIACONU, VÎLCEANU 1972, p. 27–29, 47–51, 55–57; DIACONU, DAMIAN, VASILE 2001, p. 170–172; DIACONU *et alii* 2004; DAMIAN *et alii* 2008; DAMIAN 2020, p. 273, fig. 3; DAMIAN 2021, p. 111, 114, fig. 11), but also to the additional potential for chronological framing offered by it through ¹⁴C and dendrological analysis. In the case of the former, it could settle the debate – whether the structure belongs to the Roman/Romano-Byzantine period or the medieval era, whether referring to the 9th–10th centuries or what can be generically termed “the year 1000”, and whether the commissioning political power was Bulgarian or Byzantine. As for the latter, the archaeological discoveries made in 2003 were followed by an attempt – unfortunately still unresolved – using dendrochronology to refine the timing of the Byzantine return to the Lower Danube (end of the 10th century *versus* the beginning of the 11th century).

⁸ SIMION *et alii* 2022–2023, p. 289.

present-day Siliștra). The chronological framing of the fortress's construction was thus based on archaeological and historical arguments.

The relationship between the fortification and habitation in the 10th–14th centuries, as well as the interpretation/reinterpretation of the issue of the fortification's functioning in certain periods⁹, has been highlighted by a narrowing of the inhabited perimeter in the eastern half of the fortress¹⁰. The interventions refer both to the beginning of the 11th century and to the end of the 13th century – the beginning of the 14th century, with the construction of a new enclosure wall in the southern part of the fortress, over 2 m wide, made of irregularly shaped stones, small and medium in size, with parallelepiped blocks for the facing¹¹. Starting from the early years of the 11th century, the fortress at Păcuil lui Soare lost its primarily naval base character, with intense habitation developing behind the fortress walls, which lasted, with an interruption at the end of the 11th century¹² due to a fire caused by the Cuman invasion of 1094, until the first half of the 15th century¹³, the moment of Dobruja's occupation by the Turks.

Based on the analysis of written and archaeological sources, the hypothesis was proposed that the famous Danubian locality of Vicina existed at Păcuil lui Soare¹⁴, an important commercial centre at the Lower Danube and the seat of a metropolis, which functioned until around 1359. Iakynt, the first metropolitan of Ungro-Wallachia, was also the last metropolitan of Vicina. Given the current state of preservation of the fortress, where much of its area has been engulfed by the waters of the Danube, the discovery of a metropolitan church is no longer feasible. The only material documents from Păcuil lui Soare that are Christian in content and significance, which can be invoked in this context, are the numerous and varied crosses discovered¹⁵.

⁹ A review of the elements cited regarding the functionality/non-functionality of the Byzantine curtain wall in the case of the fortification at Păcuil lui Soare during the 11th century and subsequent periods, with the referenced bibliography, can be found in DAMIAN 2020, p. 276–277 and notes 16–20. In our opinion, the explicit functional military role of the fortification at the time of its construction tends to shift as the role of the civilian settlement increases. We observe a change in the role of the curtain wall, with the focus moving from protection to demarcation/inclusion, as the fortification seems to take on a more symbolic character (militarily and politically), while still being evidently functional in terms of space occupation and utilisation for habitation.

¹⁰ DIACONU, BARASCHI 1977, p. 31.

¹¹ POPA 1964, p. 108–109; DIACONU 1973; DIACONU, BARASCHI 1977, p. 11–14.

¹² DIACONU 1972, p. 54 and note 21; BARASCHI 1987.

¹³ CUSTUREA 1982.

¹⁴ One of the key arguments in Petre Diaconu's demonstration of identifying the site at Păcuil lui Soare with Vicina (DIACONU 1970; DIACONU 1976a, p. 427–447; DIACONU 2001) is the Pisano-Amalfitan portolan, *Compasso da Navigare*, which mentions the toponym and hydronym *Vecina, flumen de Vecina vel de Danubio*, the river Vecina or the Danube, specifying the distance of 200 miles between the mouth of the Danube through the Aspera branch and that of Vecina. Converting these 200 Italian nautical miles into kilometers, with one Italian mile equaling 1734.32 m, results in 346.8 km, placing the island of Păcuil lui Soare at km 356 from the mouth of the Sulina branch on the current navigation route (DIACONU 1981, p. 2316; DIACONU 2001, p. 176). See counterarguments in the more recent discussion by Alexandru MADGEARU (2016, especially p. 64–65), as revisited by Georgi ATANASOV (2018, p. 97–98).

¹⁵ DIACONU 1976a, p. 445, fig. 12; see also MĂNUCU-ADAMEȘTEANU 2017b, p. 165–166.

Over time, the attribution of the initiative for constructing the fortress at the northeastern end of the Danube island Păcuilui lui Soare has been part of a polemic between Romanian and Bulgarian historiographies, especially in the 1960s and 1970s. Situated near the city of Silistra (= *Durostorum–Dristra/Dorostolon*), the capital of the Byzantine province of *Paristrion/Paradounavon*, and considered by Romanian historiography as a fortification built *a fundamentis* by the Byzantines in the last quarter of the 10th century¹⁶ (i.e., in the absence of a prior contribution from the Roman and Romano-Byzantine rule, specific to Dobruja), it has long been the subject of controversies with representatives of Bulgarian archaeology, who argued that the First Bulgarian State was the commissioner of the fortress's construction¹⁷.

A sensitive issue in a sensitive area: the idea of reestablishing the Byzantine frontier at the Danube at the crossroads of the 1st and 2nd millennia, in relation to aspects of power exercised by the medieval Bulgarian State, concerning a geographical region encompassing the southwestern corner of Romanian Dobruja and the northeastern part of present-day Bulgaria – in other words, a part of historical Dobruja in the mediaeval sense and a part of the former Southern Dobruja, including the Durostor district in the modern sense¹⁸. Numerous polemics related to the decisive authority in raising the island fortification, involving stratigraphic, ceramic, linguistic, and topographic arguments, faded at some point, being replaced in the 1970s and 1980s by another controversy. This new debate concerned the field of historical geography, specifically the identification of the famous and enigmatic locality of Vicina with the site on the island of Păcuilui lui Soare *versus*, generally speaking, the proposals opting for the Danube Delta region as a more suitable area for locating the city¹⁹. This time, the polemic was much broader – transcending the framework of a Romanian-Bulgarian regional confrontation on “Byzantine” grounds and the predominantly archaeological nature of the issue – and the problem remained largely open, extending into the next millennium²⁰.

The revisiting of the chronological and cultural affiliation of the site at Păcuilui lui Soare experienced a moment of revitalization in 2017, when a Romanian archaeologist and numismatist of the Middle Byzantine period, Gheorghe Mănușcu-Adameșteanu, expressed the viewpoint that the construction of the fortress at

¹⁶ For the *a fundamentis* Byzantine character of the fortress at Păcuilui lui Soare, see: NESTOR, DIACONU 1959, p. 588; DIACONU 1959, p. 653; VÎLCEANU 1963; POPA 1964, p. 107; DIACONU 1965, p. 13; VÎLCEANU 1965, p. 291, 300; DIACONU 1966, p. 367; CONDURACHI, BARNEA, DIACONU 1966, p. 7–9; POPA 1967, p. 271, 280–281, 291; DIACONU 1969, p. 398; DIACONU 1970, p. 287; POPA 1970, p. 569, 572, 577; DIACONU 1971; BARNEA 1971, p. 82; DIACONU 1972, p. 24; DIACONU 1976a, p. 412–417, with the previous bibliography; DIACONU 1976b, p. 940; BARASCHI 1991, p. 138; MĂNUȘCU-ADAMEȘTEANU 2001, p. 33–35; DAMIAN 2005, p. 143; MADGEARU 2007, p. 95; DAMIAN 2015, p. 230; DAMIAN 2020, p. 277–278, 280; DAMIAN 2021, p. 106, 110.

¹⁷ See in this regard DIACONU 1972, p. 23 and note 1; DIACONU 1976b, p. 939–941, as well as a recent review of the views expressed by Bulgarian historiography at ATANASOV 2018, p. 77–78.

¹⁸ DAMIAN 2020, p. 271–272.

¹⁹ See in this regard DIACONU 1970; DIACONU 1976a; DIACONU 1981; DIACONU 1985.

²⁰ See reruns of the Vicina location problem file at DIACONU 2001, p. 175–176; MADGEARU 2016; MĂNUȘCU-ADAMEȘTEANU 2017a, p. 140–145, 151–152, 154–157, 162, 165; MĂNUȘCU-ADAMEȘTEANU 2017b, p. 169, 199; ATANASOV 2018, p. 97–99 (with reference to ATANASOV 1994); MĂNUȘCU-ADAMEȘTEANU 2019, p. 175–176, 201–202; DAMIAN 2020, p. 289–290.

Păcuiul lui Soare could be placed in the Romano-Byzantine period²¹. We do not intend to revisit the counterarguments presented in a relatively recent study²², developed with the old arguments of archaeologists convincingly expressed since the beginning of the site's research, regarding the *a fundamentis* nature of the fortification's construction²³ (meaning in the absence of a prior contribution of Roman and Romano-Byzantine rule/civilization²⁴, specific to Dobruja²⁵), as well as the results of investigations after 2000²⁶. Instead, we aim to add another contribution to the dossier, which we became aware of later, namely that of Georgi Atanasov, who also pronounced against attributing the fortification at Păcuiul lui Soare to the Roman Empire²⁷. However, the latest stance of the Bulgarian researcher regarding the fortification at Păcuiul lui Soare raises – again! – another issue, namely its belonging to the period of the late 9th century to the first half of the 10th century. This is based on a comprehensive review of all possible analogies suggested by the archaeological data provided by sites that constituted the major capitals of the Bulgarian State, Pliska and Preslav, as well as the early medieval fortifications in southern Dobruja, such as Skala, Tzar Asen, Ruyno, Okorsh²⁸. Despite the seemingly exhaustive listing of data regarding the definition of the fortification at Păcuiul lui Soare in relation to those in northeastern Bulgaria (the structure of the curtain wall, the shape of the towers, the port installation, the ceramics, the appearance of the dwellings, the existence of incised marks on the stone blocks, a series of adornments, Cyrillic inscriptions, coin finds), Georgi Atanasov's study ignores a series of issues related to the interpretation of phenomena and the proportions of a material presence, not merely the simple presence or resemblance between complexes and artefacts from different sites.

In general, the arguments for considering a fortification as being built *a fundamentis* in the Middle Byzantine period²⁹ are provided by the presence of certain

²¹ MĂNUCU-ADAMEȘTEANU 2017b, p. 130–142, with resumption in MĂNUCU-ADAMEȘTEANU 2018, part I, p. 141–147, 559, 565.

²² DAMIAN 2020.

²³ See *supra* note 16.

²⁴ The elements belonging to the Roman/Romano-Byzantine era consist of scattered artefacts (ceramic materials, discoveries of clothing and monetary items, two glass denarii), undoubtedly documenting the existence of a settlement in the 6th century, probably considered a customs point. However, no *in situ* deposit or trace of a construction element from this period has been identified anywhere on the preserved/excavated surface of the island site. No occupational level dating to the Roman period has been identified in the fortification area, and all previous research, supported by stratigraphic evidence, has indicated that it is a foundational construction that does not overlay or intersect any archaeological reality attributable to this period (DIACONU 1972, p. 51–52 and notes 8–10, p. 187–188; DAMIAN 2005, p. 151 and notes 34–36).

²⁵ See DAMIAN 2020, p. 282 and note 67.

²⁶ Between 2000 and 2012, archaeological excavations aimed at uncovering elements of the construction system of the island fortification, covering areas of up to 750 sqm and reaching specific depths between 4 and 6 m, did not document any material or archaeological layer attributable to the Roman period (DIACONU, DAMIAN, VASILE 2001; DIACONU *et alii* 2003; DIACONU *et alii* 2004; DAMIAN *et alii* 2007; DAMIAN *et alii* 2008; DAMIAN *et alii* 2013; DAMIAN 2020, p. 282, note 65).

²⁷ ATANASOV 2018, p. 78–82, 94.

²⁸ ATANASOV 2018, p. 82–97.

²⁹ BARASCHI 1991, p. 138; MĂNUCU-ADAMEȘTEANU 2001, p. 33, 39, 45, 64; DAMIAN 2005, p. 143, 146; MADGEARU 2007, p. 89, 95; DAMIAN 2015, p. 232; MĂNUCU-ADAMEȘTEANU 2018, part I, p. 563; DAMIAN 2020, p. 277–278.

elements (such as the existence of a pre-fortification habitation level that the construction structures intersect, a situation not encountered on the island of Păcuiul lui Soare; coin finds belonging to the Macedonian dynasty period, particularly the interval of John I Tzimiskes – Basil II), and especially by the absence of others (e.g., the exclusion of any constructive connection with a fortification from the Roman/Romano-Byzantine period, based on stratigraphic evidence and studies of the masonry). A special discussion was dedicated to the coin finds, which are considered, even in the case of a reduced presence, as arguments for the fortification's construction during the Middle Byzantine period. Coins issued during the reign of John I Tzimiskes³⁰ appear in sites whose restorations or beginnings are linked to the Byzantine reconquest of the Lower Danube area during the emperor's time³¹, even if they are neither very numerous nor always discovered in completely clear contexts. Therefore, when these coin finds are associated with the presence of fortification and/or habitation elements, they can serve as chronological framing arguments, even if the stratigraphic context does not contain an irrefutable proof, such as the discovery of a coin on a constructive level.

Over time, in various studies published by the research team members of the site at Păcuiul lui Soare³², and despite a total freedom of expression of divergent viewpoints, there has been a consensus regarding the moment of the fortification's construction, which is the Middle Byzantine period, specifically the era of John I Tzimiskes, with interventions around the year 1000 and in the 13th–14th centuries through the construction of walls marking a reduction in habitation. Regardless of the technique used for these interventions (dry walls or walls bonded with very low-quality mortar for blocking entrances through thresholds/elevating the level of the northern gate-tower and the landing stage, walls made of reused stones bonded with earth, the use of different types of mortar), they did not affect in any way the initial plan of the fortification or the aspect of a "unified whole" of this remarkable architectural achievement.

From a technical point of view, Gheorghe Mănucu-Adameșteanu considered that certain construction features of the fortress, such as the wooden substructions, the "blocking" system, and the use of waterproof mortar in the construction of the enclosure wall³³, as well as highlighting the uniqueness of the construction type at Păcuiul lui Soare during the Middle Byzantine period, its archaic character³⁴, and the analogies with fortification elements from other sites³⁵, could have led

³⁰ MĂNUCU-ADAMEȘTEANU 2018, part II, p. 103 (for the silver coin /*miliaresia*), p. 128–130 (for *folleis* class A 1).

³¹ *Dinogetia*-Garvăn – 1 AE, *Noviodunum*-Isaccea – 7 AE, Nufăru – 2 AE, Capidava – 1 AE, *Axiopolis*-Cernavodă – 1 AE, *Tomis*-Constanța – 2 AR and 7 AE, *Carsium*-Hârșova – 1 AE, Derwent – 1 AR, Păcuiul lui Soare – 2 AR and 3 AE (MĂNUCU-ADAMEȘTEANU 2018, part I, p. 648–649, 652, 656–659, 743–746, 748–749, 751–752; part II, p. 103, 130).

³² DIACONU 1959; DIACONU 1961; DIACONU, POPA, ANGHELESCU 1962; VÎLCEANU 1963; POPA 1964; DIACONU 1965; VÎLCEANU 1965; DIACONU 1966; POPA 1967, especially p. 280, note 7; VÎLCEANU 1967; DIACONU 1969; DIACONU 1970; POPA 1970; DIACONU 1971; DIACONU, VÎLCEANU 1972; DIACONU 1972; POPA 1972.

³³ VÎLCEANU 1965, p. 301–302.

³⁴ POPA 1967, p. 280–292; POPA 1972, p. 33.

³⁵ POPA 1967, p. 281–288; DIACONU 1985, p. 109; DIACONU 1994, p. 88–90.

to a typological classification in the Roman period³⁶. All researchers of the Păcuiul lui Soare site emphasized the high-level construction technique, the skill of the Byzantine craftsmen in building on sand, adapting to the foundation soil quality using techniques of Roman origin, but with a universal value that cannot suggest evaluations regarding the ethnicity of the builders or the commissioners, but rather cultural continuities³⁷ and methods of adapting to the terrain's requirements, the demands of the era, and the expectations of the users. An argument in this regard is precisely the typological similarity between the fortress on Păcuiul lui Soare Island and the fortifications of the capitals of the First Bulgarian State, at Pliska and Preslav, as well as the one at Dristra, viewed through the lens of the fact that they are achievements due to Byzantine craftsmen and techniques³⁸. A special role in this sense is held by the unparalleled port installation at Păcuiul lui Soare³⁹, an argument for the adaptation of construction techniques to land/environment conditions, the triumph of functionality, rather than a marker of political/ethnic identity. The same argument of functionality, coupled with the echo of a cultural continuity, is also expressed by the choice for stone-based dwellings⁴⁰. Regarding the artefacts (ceramics, jewellery, coins) invoked by Georgi Atanasov in establishing a perfect analogy and advancing a closer chronological placement in the 9th–10th centuries, we believe that the proportion of the presence of certain categories at Păcuiul lui Soare in relation to the fortresses in northeastern Bulgaria is essential, namely the limited/restricted character in the case of the island site. The miniature Varangian axes⁴¹ may not only indicate signs of the Kievan presence in the area, but also northern material presences determined by the relationship between the Byzantine imperial power and Viking mercenary troops. The inscription discovered at Păcuiul lui Soare (which contains the names *Savos*, *Traianos*, and *Demetrios*, rendered in the genitive, in Greek declension, judging by the script of the letters)⁴², considered Cyrillic in the context of its re-edition⁴³, was initially published as being Middle Greek⁴⁴.

The historical and archaeological analysis allowed for the establishment of a relative chronology for the beginnings of the fortress at Păcuiul lui Soare, advancing several possible construction periods: hypothesis 1 – the Romano-Byzantine period (4th–7th centuries); hypothesis 2 – the period of the First Bulgarian State (late

³⁶ MĂNUCU-ADAMEȘTEANU 2017b, p. 141.

³⁷ See also POPA 1967, p. 289–290; THEODORESCU 1976, p. 118, fig. 117–120.

³⁸ POPA 1967, p. 285–288 and notes 31–41; MADGEARU 2007, p. 96.

³⁹ See, in this regard, ATANASOV 2018, p. 85–86; DAMIAN 2020, p. 287–288 and notes 93–99.

⁴⁰ See also DAMIAN 2015; PARASCHIV-TALMAȚCHI 2017, p. 211–219; DAMIAN 2021, p. 123–128, fig. 33–42.

⁴¹ ATANASOV 2018, p. 93–94, fig. 19, with the previous bibliography.

⁴² "...there is no doubt that the inscription dates from the 10th century; the letters were made by carving into stone (on a block likely originating from the enclosure wall of the Byzantine island fortress, discovered on the beach formed by the waters of the Danube within the fortification) using a chisel or a small knife, and the excavated space was filled with waterproof mortar containing a high amount of crushed brick, explaining the red color of the letters..." (DIACONU 2007, p. 161–163).

⁴³ PETOLESCU 2008, p. 173–175; see also ATANASOV 2018, p. 94, fig. 20, with a chronological setting at the beginning of the 10th century.

⁴⁴ DIACONU 2007.

9th century – first half of the 10th century, when, following several victories over the Byzantines, Tsar Simeon I achieved the maximum territorial expansion of his rule); hypothesis 3 – the return of Byzantine domination to the Lower Danube (the last quarter of the 10th century – early 11th century, during the reign of the Macedonian dynasty emperors, John I Tzimiskes and Basil II), with rich arguments both for and against each (see above).

Radiocarbon dating using the AMS method represents the first attempt at an **absolute chronology**, marking the most probable moment for the construction of the enclosure wall on the excavated portion. This enclosure wall, based on arguments brought forward by archaeological excavations conducted over more than 60 years, can be associated with the moment of raising the first stone constructions on Păcuilui Soare Island, a component of a strategically important fortress for the southern area of today's Dobruja region.

Premise

In 2021, a fragment was extracted from one of the discovered oak beams, part of the wooden substructure of the fortress (see above), which exhibited important conservation characteristics for dendrological, dendrochronological, and radiocarbon dating analysis. The fragment was sent to "Ștefan cel Mare" University in Suceava for dendrochronological analysis and to select the most representative sample for radiocarbon dating⁴⁵. The primary analysis confirmed the wood species as oak. It also verified the good state of preservation and that the sequence of rings chosen for radiocarbon dating, from the fragment sent from the archaeological site in 2021, represents a portion from the last decades of the tree's life. Moreover, the initial dendrochronological dating attempts established that the rings from the beam fragment represent a growth period preceding the year 1080, the lower limit of the floating scale with which the Suceava team conducts such precise dating.

Hypotheses

Given the position on the tree trunk, the sequence of rings, and the placement below the lower limit of the dendrochronological scale from Suceava, the tree was cut before the year 1080. Because the moment of the tree's felling could be established with some accuracy, the sample selected for radiocarbon dating can provide greater precision as to when, exactly before the year 1080, the living tree was cut down.

Radiocarbon dating

The radiocarbon dating was carried out in 2022⁴⁶ at the RoAMS laboratory in "Horia Hulubei" National Institute for R&D in Physics and Nuclear Engineering Măgurele-Ilfov. The process involved the pre-treatment of the wood by purifying the holocellulose, graphitizing it to obtain intimate charcoal deposited on the iron catalyst (AMS target), and measuring the remaining carbon-14 in the wood after it

⁴⁵ MANNING, BIRCH 2022, p. 279–308.

⁴⁶ SIMION *et alii* 2022–2023, p. 289.

was cut, using AMS technique⁴⁷. Through the programs associated with the processing of experimental data, the level of carbon-14 in the measured rings can be determined at the date before the tree was cut, thus providing the conventional radiocarbon age (CRA), meaning the time elapsed from the cutting until the measurement, with a certain degree of imprecision in the measurements; the values are indicated within parentheses⁴⁸ (Fig. 8). In the final sequence of analysis, machine years are calibrated into calibrated calendar years, which can be historically interpreted using the OxCal online program⁴⁹.

Absolute chronology

The histogram (Fig. 8) confirms that the main sub-intervals fall before the year 1080 AD, with the two analysis, preliminary dendrochronology and radiocarbon dating, supporting each other. It also establishes the lower limit of the interval in which the rings were alive and balanced with the carbon-14 levels in the air, namely the year 894 AD.

Based on the sample selected as representative of the tree's lifespan and the most probable moment of its felling, it can be said that this can be associated with the interval calAD 946–1048. The other sub-intervals cannot be excluded in terms of probability/statistics; however, it can be stated that, chronologically, the dominant interval best reflects not only the period during which the tree was alive but also the closest moment to when it was cut down, thus interrupting its balance with the carbon dioxide in the air, and "starting" the chronological clock showing the radiocarbon decay, determinable through AMS measurement.

Interpretations

The tree rings being attributed to the final decades of the tree's life, the sub-intervals can be interpreted as follows:

1. with a 9.3% probability, sometime between calAD 894–928 or in the immediate decades, the tree was felled and used in the foundation of the enclosure wall (historical hypothesis 2);

2. with a 76.1% probability, the event dated through the tree occurred between calAD 946–1048 and corresponds historically with hypothesis 3.

The two analysis exclude hypothesis 1 for the construction of the enclosure wall.

Conclusions

We consider it well-founded to assert that the radiocarbon dating and the preliminary dendrochronological analysis of the sample taken from the wooden sub-structure of the fortress on Păcuiul lui Soare Island, representative of the moment

⁴⁷ WACKER, CHRISTL, SYNAL 2010, p. 976–979; ADOLPHI *et alii* 2013, p. 391–400; SAVA *et alii* 2019, p. 649–658.

⁴⁸ RAMSEY 1995, p. 425–430; REIMER *et alii* 2020, p. 725–757.

⁴⁹ OxCal v.4.4 program and calibration curve IntCal20, the online version generated by Radiocarbon Unit of the Oxford UK Laboratory: <https://c14.arch.ox.ac.uk/oxcal.html>.

the wall foundation was built, confirm the archaeological-historical analysis of the site, supporting the hypothesis that the fortress was built *a fundamentis* during the return of Byzantine dominion to the Lower Danube.

This conclusion can be nuanced in probabilistic terms, with approximately 10% representing the period of the First Bulgarian State (late 9th century – first half of the 10th century) and approximately 80% representing the return of Byzantine dominance to the Lower Danube (last quarter of the 10th century – early 11th century).

The fact that the two calibrated sub-intervals end at calAD 928 and begin at calAD 946 becomes a factor that distinguishes the radiocarbon results between these two historical events, with the majority weighting in favour of the Byzantine Empire.

In the 76.1% probability sub-interval (calAD 946–1048), there are two peaks around the calAD 977–1036 range (the most restrictive interval for attribution), which support the historical event of the tree's felling and the construction being raised in the last quarter of the 10th century.

The completion of the dendrochronological analysis and any further dating could provide decisive arguments in favour of this hypothesis.

Acknowledgements

The radiocarbon dating was carried out within the NUCLEU project, project PN 23210201 and PN 23210102, financed by the Ministry of Research, Innovation and Digitization Romania. The experiments were carried out at the Tandatron™ 1MV accelerator from “Horia Hulubei” National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH), and were supported by the Romanian Government Program through National Program for Infrastructure of National Interest (IOSIN funds).

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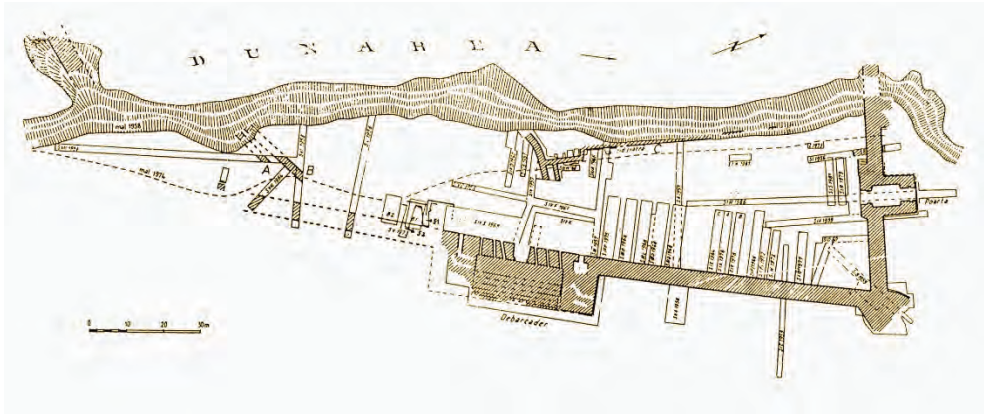


Fig. 1. Păcuiul lui Soare. Plan of the Byzantine fortification (after Baraschi 1987, fig. 1).



Fig. 2. Păcuiul lui Soare. The northern enclosure wall, destroyed by the waters of the Danube on the western side, 2000 campaign.



Fig. 3. Păcuiul lui Soare. The gate tower, 2000 campaign.



Fig. 4. Păcuiul lui Soare. The port installation, 2007 campaign.



Fig. 5. Păcuiul lui Soare. The southern sector, 2003 campaign.



Fig. 6. Păcuiul lui Soare. The southern sector, with the visible wooden substructure, 2003 campaign.



Fig. 7. Păcuil lui Soare. The southern sector, with the visible wooden substructure, 2003 campaign.

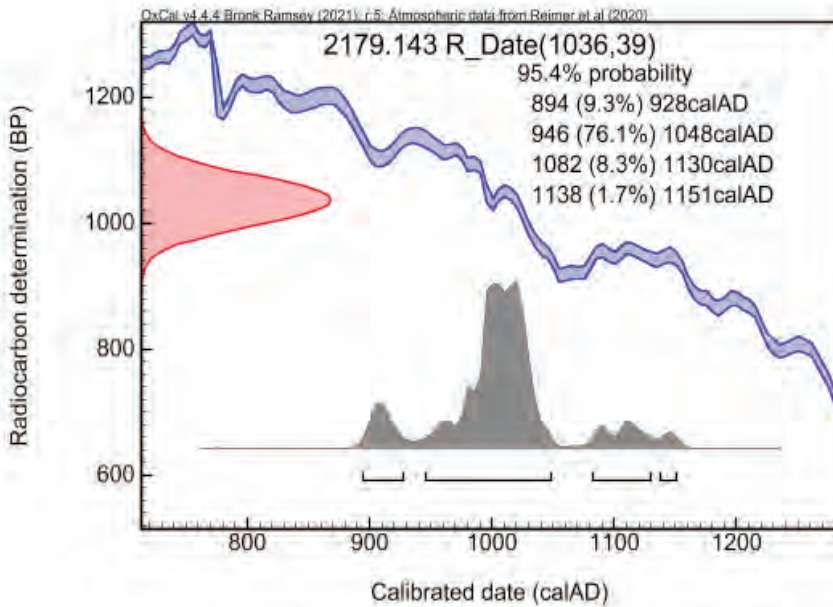


Fig. 8. The histogram obtained through radiocarbon dating for the wood sample from Păcuil lui Soare, at the RoAMS laboratory in Romania.