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Grzegorz Skrzyński[1]

ARCHAEOBOTANICAL RESULTS FROM EARLY MEDIEVAL RADOM, CENTRAL POLAND, WITH A SPECIAL EMPHASIS ON THE OLDEST FINDS OF BOG BILBERRY (*VACCINIUM ULIGINOSUM*)

ABSTRACT

Skrzyński G. 2021. Archaeobotanical results from early medieval Radom, Central Poland, with a special emphasis on the oldest finds of bog bilberry (*Vaccinium uliginosum*). *Sprawozdania Archeologiczne* 72/2, 275-286.

The article presents one of the most interesting results of an archaeobotanical analysis of material from the early medieval settlement complex in Radom. These results provided data on useful plants and the paleoenvironment of the site. In the case of two species, it was possible to designate specific sites of their origin.

The most interesting species mentioned above are *Origanum vulgare* and *Vaccinium uliginosum*. The first one could only grow at one site, slightly away from the settlement. Regarding the second species, the closest sites of occurrence of *V. uliginosum* can presently be found 40 km from the excavated site. This is quite a long distance from the point of view of early medieval man. It is worth emphasising that the finds of bog bilberry are the oldest remains of *V. uliginosum* that have been discovered at a Polish archaeological site.

Keywords: archaeobotany, *Vaccinium uliginosum*, bog bilberry, early medieval Radom, ethnobotany
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1 Polish Academy of Sciences Museum of the Earth in Warsaw, Al. Na Skarpie 20/26, 27, 00-488 Warszawa, Poland; grzegorz.skrzynski@gmail.com; ORCID: 0000-0002-2283-0924

INTRODUCTION

The early medieval settlement complex in Radom consists of the 'Piotrówka' stronghold (Site 1), five open settlements (Sites 2, 3, 4, 5 and 6) and the burial ground (Site 4) (Fig. 1). This complex was explored and partially examined in the second half of the 20th century as part of archaeological work conducted in the town by the Institute of the History of Material Culture of the Polish Academy of Sciences (now: Institute of Archaeology and Ethnology of the Polish Academy of Sciences) over a period of at least a dozen years (Skubicha 2010, 106-112). Unfortunately, the results of these excavations have never been fully processed. Apart from some brief reports (Gąssowski 1951; Kierzkowska 1966; Kierzkowska-Kalinowska 1970; 1979; Kierzkowska and Kierzkowski 1961), they were not published till the years 2016 (Kurasiński and Skóra 2016) and 2019-2020 (Baranowski and Skrzyńska 2019; Baranowski *et al.* 2020).

In the excavation seasons 2009-2012, new archaeological work was conducted as part of the revitalisation project of the municipal cultural park 'Old Radom'. Its main aim was to revitalise the stronghold area and its surroundings. The whole settlement complex at

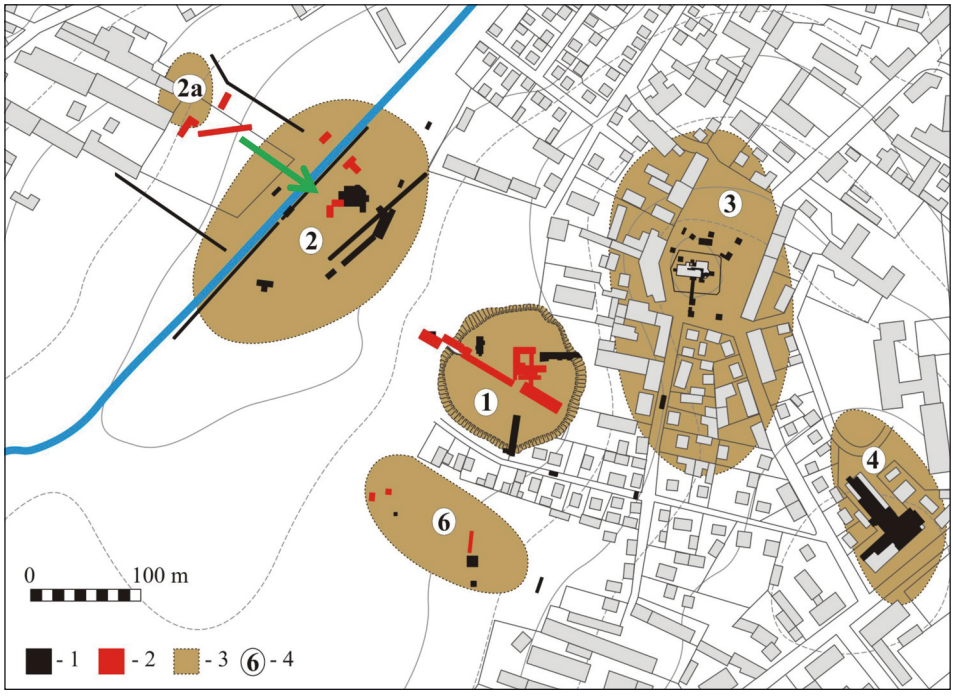

Fig. 1. The Radom settlement complex with the location of Feature 1 (green arrow).
1 – trenches from the 20th century, 2 – trenches from the 21st century, 3 – extent of site, 4 – site number.
Drawing by M. Trzeciecki, modified

this site was explored again (Auch and Trzeciecki 2011; Trzeciecki 2010; Solarska and Trzeciecki 2011; Kalaga and Wajda 2011; Zapłata 2011), including Site 2, where soil samples for macroscopic examination of plant remains were taken.They were collected mainly to determine the taxa used by the early medieval inhabitants of the settlement.

A second batch of material was obtained in 2016. The aim was to obtain the remains for reconstruction of the palaeoenvironmental background of the colonization process (for this purpose, also other samples were taken from the area of the entire settlement complex (Skrzyński, unpub.) and for ^{14}C dating.

MATERIAL AND METHODS

The results of archaeological examination define Site 2 as an open settlement of auxillary function in relation to the stronghold. The site occupies an area of approximately 5 ha and extends on the both banks of the Mleczna River (Solarska and Trzeciecki 2011, 116). In 2011, archaeological excavations were undertaken to evaluate the state of preservation of the wooden structures discovered there in the 1960s and 1970s, and to obtain wood samples for dating of the settlement complex. Parts of a wooden building (Feature 1) were excavated in the trench situated in the central part of the site (Figs 1, 2). Archaeologists established

Fig. 2. Remains of early medieval building (Feature 1). Photo by S. Wajda

Table 1. Results of Accelerator Mass Spectrometry radiocarbon dating

Inside of the building			Otside of the building		
Sample	Sample ID	Result	Sample	Sample ID	Result
Rdm/11/01	Poz-98812	869AD-1013AD (94.2%)	Rdm/16/17	Poz-98814	769AD-901AD (87.5%)
Rdm/11/02	Poz-99361	773AD-906AD (71.8%)	Rdm/16/18	Poz-98815	776AD-971AD (95.4%)

the building had an interlocked-corner log structure with remains of wooden planks at the bottom layer that most likely formed the floor. Unfortunately, the condition of the wood was very poor and the ground water obstructed the full examination of soil strata in the trench. Cultural layer 3 was identified as the oldest floor level. Based on analysis of archaeological material sampled from this strata (mainly pottery, bone artefacts), the building can be dated to the 9th-11th centuries (Auch *et al.* 2012, 31). This layer was the source of the soil samples for the analysis of macroscopic plant remains. Eight soil samples (each of volume approximately 2 dm^3) were obtained during the excavations. Part of them were examined in 2012 (Skrzyński 2013; 2018). To verify the data obtained from the structure, as a part of the new research conducted in 2015-2018, supplementary samples were taken by drilling the cultural layer outside the building. Each of 3 additional samples gained (using a Russian borer: 'Instorf' sampling probe) was about 1 dm^3 volume. Due to the nature of the sampled layer (organic remnants with a slight admixture of mineral fraction), each soil sample was initially macerated in a 10% solution of KOH to obtain adequate particle breakup. Material was then washed on sieves with 2.0-0.2 mm mesh size in order to isolate the plant material. Analyses of macroscopic plant remains were done by using an Olympus SZ30 binocular microscope at 9-80× magnification range.

To verify the results of archaeological dating, the selected plant remains were dated by Accelerator Mass Spectrometry (in the Poznan Radiocarbon Laboratory). Unfortunately, only charred remains gained in 2011 from Feature 1 were suitable for radiocarbon dating because waterlogged ones had been preserved and stored in a glycerin-thymol solution. So, a caryopsis of *Triticum aestivum* (sample Rdm/11/01) and an achene of *Fallopia convolvulus* (sample Rdm/11/02) were selected from inside of the building construction. Plant materials from the cores were not contaminated by synthetic organic compounds therefore waterlogged wood of *Alnus* sp. was chosen (sample Rdm/16/17). A second sample for ^{14}C dating from the exterior cultural layer was an achene of *Polygonum lapathifolium* ssp. *lapathifolium* (sample Rdm/16/18).

Taxonomic determination were carried out using the set of publications and keys for taxonomic identification of plant seeds and fruits (Cappers *et al.* 2006; Körber-Grohne 1964; 1991; Kulpa 1984; Marek 1954; 1958; Rudnicka-Sterna 1972). For wood identification, F. Schweingruber's key was used (Schweingruber 1978). The carpological collections of the Department of Paleobotany of the W. Szafer Institute of Botany in Cracow and the author's own reference collections were also used. The names of plants are given according

the Polish botanical nomenclature (Mirek *et al*. 2002). The simplified ecological affiliation of the determined taxa was prepared on the basis of W. Matuszkiewicz's publication (2001) and empirical data. The results of ^{14}C dating were calibrated using the OxCal v4.2.3. The accuracy of dating was set on 95.4 % probability (Tab. 1).

RESULTS

In total, 818 macroscopic plant remains were gained during the analytical process. Most of them (728) came from the strata located inside the building, while 90 were found in samples from the exterior cultural layer. Both sources provided both waterlogged and charred remains. Detailed results of the analyses are presented in the list of determined taxa with their ecological affinity (Tab. 2).

The largest group of remains represent crop weeds and ruderal plants. From this group only two species are cereal weeds (*Rhinanthus* cf. *serotinus*, *Vicia tetrasperma*), the rest are highly nitrophilous and ubiquitous plants. The second large group of taxa are meadow and pasture plants. It is possible that these plants appeared in the fresh, semi-anthropogenic meadows of the Mleczna River valley in the Middle Ages. In the case of the wetland plants, most of them could have entered the area of the archaeological site as the result of

Table 2. List of determined macroscopic plant remains and their ecological affiliation

Ecological classification	Taxa	Feature 1		Core 16/17		Core 16/18		Core 16/19	
		Number of charred/waterlogged remains							
Crops	*Brassica* cf. *rapa*		1						
	Lens culinaris	2							
	Panicum miliaceum		17	1					
	Secale cereale	8						1	
	Triticum aestivum	4	1						
Meadows and pastures	*Achillea millefolium*	7	3						
	Juncus conglomeratus		11						
	Origanum vulgare		4						
	Poa trivialis			1					
	Potentilla anserina		47						
	Ranunculus acris		7						
	Ranunculus repens	2	5						
	Rumex acetosa	4	3					1	
	Stachys palustris		4						
	Veronica serpyllifolia	5	8						

Ecological classification	Taxa	Feature 1		Core 16/17		Core 16/18		Core 16/19	
		Number of charred/waterlogged remains							
Weeds and ruderal plants	*Ballota nigra*		3						
	Carduus nutans		6						
	Chenopodium album	7	31	1	2	1	3		4
	Cichorium intybus	11	2						
	Cirsium arvense	14	17	1			1		1
	Digitaria sanguinalis	7							
	Fallopia convolvulus	5	2	2					
	Galium aparine	15	12	1					
	Galium spurium	8	9					1	
	Melandrium album	10	21						
	Poa annua							1	
	Polygonum aviculare	3			1				
	Polygonum lapathifolium ssp. *lapathifolium*	12	4			1			
	Polygonum lapathifolium ssp. *pallidum*		7						
	Polygonum persicaria							1	
	Rhinanthus cf. *serotinus*	1							
	Rumex acetosella	9	4						
	Stellaria graminea			-			1		
	Stellaria media		9						
	Urtica dioica	2	19	1		1	3	1	
	Urtica urens							1	
	Vicia tetrasperma	4							
	Herniaria sp.		2						
Forests and clearings	*Pinus sylvestris*								
	Rubus idaeus		35		1		1		2
	Sambucus nigra		14						
	Sorbus aucuparia		5						
	Alnus sp.	130	14	1	2		1	1	1
	Rubus sp.				1				
Wetlands	*Juncus bufonius*		23				4		2
	Ranunculus sceleratus		25						
	Vaccinium uliginosum		11						
	Typha sp.		43						

Ecological classification	Taxa	Feature 1		Core 16/17		Core 16/18		Core 16/19	
		Number of charred/waterlogged remains							
Unclassified	*Carex* sp.				1				
	Juncus sp.				1	3		1	
	Galium sp.			1					
	Caryophyllaceae						1		
	Chenopodiaceae				2	1			
	Cyperaceae						1		
	Lamiaceae						1		
	Poaceae			2		1			1
	Polygonaceae								1
	Indeterminate	11	18	2	4	4	7		2

periodic floods. The discovered plant remains could also have come to the site through human activity consisted of exploitation of riverside areas. There are also some plant remains that represent forest and forest clearing communities – i.e. areas which were probably exposed to high anthropopression. The samples collected from layer 3 of Feature 1, apart from the remains of edible fruits of wild plants, also contained seeds and fruits of cultivated plants. The plant material contained seeds of turnip *Brassica* cf. *rapa* and lentils *Lens culinaris*. Cereals were represented by common millet *Panicum miliaceum*, common wheat *Triticum aestivum* and rye *Secale cereale*. Almost all remains of cultivated plants were charred, only one caryopsis of *T. aestivum* was waterlogged.

DISCUSSION AND CONCLUSIONS

The results of AMS confirm the dating based on the archaeological analysis of the artefacts. They are also convergent with the dendrochronological data, which showed that the trees used to make the wooden well found in another part of the site were felled in 888 AD (Zapłata 2011). Moreover, they coincide in their scope with the results of dating of the other organic samples from cores gained from the settlement complex and also plant materials found during the excavations in the 1960s and 1970s (Skrzyński unpub.). The AMS also confirmed that the waterlogged remains came from the same period as the charred ones found in the same cultural layer.

All plant remains show the main basic plant communities of areas used by human. The main group of plants which had economic value are crops. Their presence is indirectly evidenced by the fruits and seeds of segetal weeds and weeds of root crops, as well as the remains of the crops themselves. The most common cereals in Poland during the entire Middle Ages are common wheat *T. aestivum*, common millet *P. miliaceum* and rye *S. cereale*

(Lityńska-Zając and Wasylikowa 2005, 492, fig. XIX-7), which were also grown in Radom. Other crops found at Site 2 are lentils *Lens culinaris* and probably a turnip *Brassica* cf. *rapa*.

It should be noted that the listed plants have different habitat requirements and most probably were not cultivated in the same areas. *P. miliaceum* and *S. cereale* were sown on poor soils, but *T. aestivum* needs more fertile soils. The same as the cultivation of *L. culinaris* and *Brassica rapa* that also require better soils. Therefore it is possible that less demanding cereals were grown in areas slightly distant from the settlement, while the plants with higher trophic requirements were grown on the terraces of the Mleczna River built of fertile peats. The fertile flooded areas were also covered by meadows that probably were a reservoir of fodder for animals kept in the settlement complex.

Ruderal plants are directly related to the functioning of the settlement itself – they develop on nitrogen-rich soils of roadsides, dumps and other similar areas transformed by human. Hence, their presence may indicate the relatively advanced development of the settlement.

Other evidence of the economic use of plants are numerous charcoal finds and seeds of plants from forest clearings. They are evidence that the inhabitants of the settlement conducted forest management providing building material and fuel. This is confirmed by the finds of alder *Alnus* sp. and Scots pine *Pinus sylvestris*. Also the development of light-requiring plants such as rowan *Sorbus aucuparia*, black elder *Sambucus nigra* or raspberry *Rubus idaeus* is indirect evidence of deforestation. On the other hand, the presence of these species may be evidence of the occurrence of ecotone plant communities. Apart from the presence of these trees and shrubs in the forest clearings and/or on forest margins, the accumulation of their seeds inside of Feature 1 probably illustrates the process of collecting their fruits for consumption (Szubert 1827; Łuczaj 2004).

Moreover, there were other noteworthy wild plants that would have been valuable for the early medieval economy. Among the identified taxa, there were plants whose green parts were probably consumed during periods of famine. The most important of them are sorrels *Rumex acetosa*, *R. acetosella* and goosefoot *Chenopodium album* (Maurizio 1926, 111, 113). The fruits of herbs such as chicory *Cichorium intybus*, yarrow *Achillea millefolium* and silverweed *Potentilla anserina* have also been found. However, considering the validity of the hypothesis about consumptional usage, it should be pointed that it was formulated mainly on the basis of the ethnobotanical data and the fact of presence of these species. Due to the lack of preservation of their vegetative parts, there is no direct evidence that supports that hypothesis.

It seems that the most interesting of the collected wild plants are wild marjoram *Origanum vulgare* (Fig. 3) and bog bilberry *Vaccinium uliginosum* (Fig. 4).

O. vulgare is a commonly known spice plant and herb. In folk medicine, it was considered as an effective sedative "in some psychiatric disorders such as hysteria and erotomania" (Ożarowski 1982). This perennial plant has specific habitat requirements – it grows in

Fig. 3. Seed of *Origanum vulgare*. 1 mm scale
Photo by Katarzyna Cywa

Fig. 4. Seed of *Vaccinium uliginosum*. 1 mm scale
Photo by Grzegorz Skrzyński

alkaline soils rich in calcium carbonate (Zarzycki *et al.* 2002, 86). In the vicinity of the site, such soils, formed on cretaceous limestones, are found only in Jeżowa Wola (now a district of Radom), near the Mleczna River, about 5 km from the studied settlement complex (Jaśkowski *et al.* 2014, 16).

The most interesting of all the finds, however, are the seeds of bog bilberry. Eleven partially humified seeds of *V. uliginosum* were found. So far, this species has been found in archaeological deposits in only in three large Polish cities – Kołobrzeg (Latałowa and Badura 1996), Cracow (Tomczyńska and Wasylikowa 1999) and Gdańsk (Badura 2011), and at the medieval site of Lębork-Rynek (Tomczyńska and Lityńska-Zając 2014). It is important to note that the finds from Radom are the oldest such remains found on the territory of Poland.

Vaccinium uliginosum is a 75-100 cm or sometimes taller, winter deciduous shrub featuring ground-laying main sprouts and raised twigs. The fruit is a spherical or elliptic multiple-seed berry with a bluish hued dull surface. Typically, the plant can be found in wet or swampy forests with acid soils and transient and raised bogs. The species is characteristic for the *Vaccinio uliginosi – Pinetum* association, *i.e.* the swampy forest (Matuszkiewicz 2001, 352, 353). Today the plant can be found approximately 40 km to the north and west of Radom (Matuszkiewicz 2008: chart C3), and it was probably also the same in the early Middle Ages. The bog bilberry in local dialect is named *pijanica* or *durnica* which in free translation means: *drunk berry* or *foolish berry* (Jundziłł 1811, 127, 128; Szubert 1827, 277, 278). It is supposed to cause a slightly intoxication effect because the surface of the fruit is colonized by a saprophytic fungus (Łuczaj 2004, 40, 41).

The seeds of *Vaccinium uliginosum* that were found in Radom may be evidence of trade-connections between the Radom population and inhabitants of the areas where the

bog bilberry naturally occurred. It is also possible that the inhabitants of the settlements located near the 'Piotrówka' stronghold had more direct contact with the 40 km distant swampy forests. The bog bilberry fruit was most probably foraged for consumption. But the question whether these berries were treated as a foodstuff or sought for their intoxicating properties remains open.

The results of archaeobotanical analyses presented here have shed new light on the early medieval settlement complex located in the Mleczna River valley in Radom. Both the results of archaeological research and these archaeobotanical analyses have contributed to a widening of the knowledge of the historical and cultural realities of human existence and about the mechanisms of the functioning of early medieval proto-town communities.

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