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RUDJER BOŠKOVIĆ INSTITUTE RADIOCARBON MEASUREMENTS XVIII

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ABSTRACT. In this paper we present dating of archaeological samples from Croatia only performed since our last reports (Obelić et al. 2011; Horvatinčić et al. 2012). Liquid scintillation radiometric measurement technique with benzene synthesis (LSC-B) and accelerator mass spectrometry (AMS) technique were applied.

KEYWORDS: archaeological samples, Croatia, cultural heritage.

INTRODUCTION

In this report we present dating of various archaeological (charcoal, bones, wood) and cultural heritage (art objects) samples from Croatia. They have an identifying number denoted by Z (Zagreb Radiocarbon Laboratory). Most samples were measured by liquid scintillation counter technique using benzene synthesis (LSC-B) (Horvatinčić et al. 2004) and they are identified by B code numbers. Some samples were measured by accelerator mass spectrometry (AMS) after graphite was prepared in our laboratory (Krajcar Bronić et al. 2010; Sironić et al. 2013) and they are identified by A code numbers. Graphite targets were measured at Scottish Universities Environment Research Centre (SUERC) between 2007 and 2013 (up to A642) and since then at University of Georgia, Athens, GA, AMS facility (UGAMS). We use Oxalic Acid II (NIST SRM4990C) as modern standard, and anthracite and Carrara marble as background. All data on samples, sample preparation and measurements are recorded in a relation database ZAGRADA (Portner et al. 2010). Laboratory participated in ^{14}C intercomparison VIRI and SIRI studies (Sironić et al. 2013; Krajcar Bronić et al. 2015).

^{14}C results are presented as rounded conventional radiocarbon ages. Age calculations follow the conventional protocol (Mook and van der Plicht 1999) based on the Libby half-life of 5570 yr and using AD 1950 as the reference year. Ages and standard deviations (1σ error) of samples are adjusted for stable isotope fractionation to normalized concentration ratio ($\delta^{13}C = -25‰$) according to recommendations in Stuiver and Polach (1977) and using the default $\delta^{13}C$ values if not measured. Whenever available, measured $\delta^{13}C$ value is also given. Calibrated ages are calculated from non-rounded ^{14}C conventional ages by using the on-line program OxCal v.4.4 (Bronk Ramsey 1995, 2017; Bronk Ramsey and Lee 2013) with 1σ error (confidence level 68.3%) and IntCal20 atmospheric curve (Reimer et al. 2020). When several calendar age ranges are obtained, probability for each interval is given. Probabilities less than 5% are omitted.

Series and sample description follow data obtained by submitters and their description of the work performed at locations published in HAG (2004–2010). When available, the expected ages or period of origin are also given. Figure 1 shows the map of Croatia with the main cities mentioned in sample description.

Continental Croatia

Vinkovci—Sopot Series

Samples of charcoal from systematic excavations at Late Neolithic archaeological site Sopot near Vinkovci, E Croatia (45°15′51″N, 18°46′4″E) (Figure 1, city 1). Continuation of research

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Figure 1 Map of Croatia with the cities mentioned in text: 1—Vinkovci; 2—Osijek; 3—Požega; 4—Slavonski Brod; 5—Virovitica; 6—Nova Gradiška; 7—Bjelovar; 8—Sisak; 9—Petrinja; 10—Zagreb; 11—Veliki Tabor castle; 12—Samobor; 13—Karlovac; 14—Gospić; 15—Knin; 16—Pula; 17—Poreč; 18—Umag; 19—Krk Is.; 20—Pag Is.; 21—Zadar; 22—Split; 23—Hvar Is.; 24—Brač Is.; 25—Korčula Is.; 26—Rab Is.; 27—Dubrovnik.

described in Obelić et al. (2004). Collected from 2001 to 2006 and submitted 2008 by M. Krznarić Škrivanko.

Comment: (MKŠ) Expected Late Neolithic period. Until 2005 ^{14}C analyses of 19 samples of charcoal were conducted in three laboratories: Rudjer Bošković Institute in Zagreb (Z-3866, Z-3869 and Z-3870), Beta Analytic Inc. Miami and Radioanalytical lab of the Marzeev Institute of Hygiene and Medical Ecology located in Kiev, Ukraine. They showed that the life on Sopot lasted at least 800 years during the fifth millennium BC (from 4848 to 4030 cal BC). Besides the expected finds of the Sopot culture (HAG4/2007:64-68), the excavation in 2008 confirmed the existence of the Starčevo culture (HAG5/2008:89-92, Jurić et al. 2001) dwelling objects at this site, confirmed also by the movable finds (Z-4239 and Z-4240).

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In this paper, we present dating of archaeological samples from Croatia performed since our last reports (Obelić et al. 2011; Horvatinčić et al. 2012). Liquid scintillation radiometric measurement technique with benzene synthesis (LSC-B) and accelerator mass spectrometry (AMS) technique were applied.

Z-3869 Sample 1/2004 **5900 ± 75 BP**
B361

Probe Sopot III, SU207, block 13, quadrant L35, depth 0.68 m, house (4848–4693 cal BC, 63.0%).

Z-3870 Sample 1/2005 **5840 ± 80 BP**
B366

Sopot III, SU 238-239, block 10, quadrant G34, depth 0.72–2.06 m, charcoal from house construction (4795–4602 cal BC, 66.8%).

Z-4239 Sample 21/2008 **6775 ± 90 BP**
B635

Probe Sopot III, SU 519, block 12, quadrant L36, charcoal from a dugout (5746–5616 cal BC, 62.3%).

Z-4240 Sample 37/2008 **6520 ± 135 BP**
B654

Probe Sopot III, SU 519, block 12, quadrant K37, charcoal from a dugout (5617–5586 cal BC, 8.2%; 5567–5366, 60.1%).

Osijek Series

Various samples from town Osijek (Figure 1, city 2) and surroundings, E Croatia, collected and submitted by Museum of Slavonia staff in Osijek.

Z-3750 Čepin—Ovčara PU-6 **6010 ± 60 BP**
B253

Charcoal found 3.30 m deep in a Neolithic cultural layer covered by medieval building complex at the site Ovčara "Turkish cemetery" in Čepin near Osijek (45°30′19″N, 18°34′4″E). A very large number of archaeological finds of Middle and late Neolithic (Sopot) Culture were collected: fragments of ceramics, pear-shaped and biconical weights, ceramic balls, small lithics, axes and chisels, worked bone and shell jewelry (HAG2/2005:9-10, Šimić 2013). Collected and submitted 2006 by J. Šimić. Previous measurements: Z-3263 (5500 ± 90 BP), Z-3264 (5900 ± 90 BP), Obelić et al. (2011).

Z-3751 Čepin—Ovčara PU-12 **5910 ± 50 BP**
B254

Charcoal inside of a fireplace, 3.40 m deep (4837–4721 cal BC, 68.3%).
Comment: (JŠ) Expected Sopot culture, ~6000 years.

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Z-3752 Aljmaš—Podunavlje **4600 ± 70 BP**
B277

Bone 16 as a part of ritual burial of cattle (HAG2/2005:7-8) found 2005 in pit SU 15/16 of the site Podunavlje in village Aljmaš, E of Osijek (45°31′45″N, 18°57′17″E), as described in Pasarić and Trbojević Vukičević (2015). (3512–3427 cal BC, 26.5%; 3383–3328, 19.7%; 3225–3183, 12.5%; 3155–3111, 9.8%). Previous measurements: Z-3106 (4445 ± 105) (Obelić et al. 2011).

Comment: (JŠ) Expected Baden culture, ~6000 years.

Z-3753 Osijek—Retfala **4330 ± 60 BP**
B278

Cattle bone found 2004 in the pit SU 17/18, 1.70 m deep, in Retfala, city district in the western part of Osijek, Croatia (45°33′52″N 18°38′56″E), as described in Pasarić and Trbojević Vukičević (2015) (3014–2896 cal BC, 68.3%). The whole cattle skeleton, most probably ritually buried, was found in the pit with Baden-type pottery. Such ritual burials of cattle were found also at some other excavations of Baden culture sites (HAG1/2004:11-12), cf. Z-3752.

Comment: (JŠ) Expected Baden culture, more than 3000 years.

Z-4071 Osijek—Darda **200 ± 50 BP**
B500

Wood extracted from sludge of the swamp Mala Đola during the cleaning of ponds and backwaters along the Baroque Esterházy Palace in Darda, municipality north of Osijek across the Drava River in Baranja region (45°37′24″N, 18°41′20″E). Collected 2008 and submitted by M. Radić, Museum of Slavonia, Osijek. It is assumed that it could belong to wooden poles of the northern end of the Ottoman bridge (architect Mimar Sinan) over Drava River built during the advance of Suleyman the Magnificent towards Vienna in 1566, and afterwards burnt by Austrian troops during the reconquest of Slavonia (eastern part of Croatia) in 1686 (cal AD 1650–1690, 18.1%; 1728–1808, 38.1%; 1922–. . . , 12.0%).

Z-4008 Osijek—Stadium **315 ± 45 BP**
B460

Wooden beam taken from the struts, the ridge board of the house near Stadium of Osijek, Stadionsko Naselje (Stadium settlement) street (45°32′45″N, 18°41′41″E). Collected 1968 and submitted 2008 by M. Orkić, Svod Ltd., Osijek (cal AD 1506–1595, 54.3%, 1617–1641, 14.0%).

Novi Perkovci—Krčavina Series

Samples taken during protective archaeological research at the site Krčavina near village Novi Perkovci (45°15′19″N, 18°20′47″E) at the area of 18,000 m^2 during the construction of the highway Budapest – Ploče, section Đakovo – Sredanci. The remains of the settlement from Starčevo and Sopot cultures (Neolithic), Litzen ceramics (Early Bronze Age) and the Barice – Gređani (Late Bronze Age) were found (Marković and Botić 2006, Botić 2011, 2013a, 2013b). Samples collected and submitted 2006 by K. Botić, Institute of Archaeology, Zagreb.

Comment: (KB) Expected between 3000 and 4000 BC, Sopot culture.

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Z-3799 Krčavina #1 **5860 ± 140 BP**
B336

Charcoal from quadrant H/29, SU 619, U-199, 116.00 m a.s.l. (4898–4546 cal BC, 68.3%).

Z-3800 Krčavina #2 **6040 ± 100 BP**
B335

Charcoal from quadrant I/29, SU 621/622, U-191, U-194 and U-195, 116.00 m a.s.l. (cal BC 5052–4797, 65.6%).

Požega Series

Charcoal samples found 1–1.5 m deep in cultural layer SU 005 during trial archaeological research at late Middle Ages site in Kanižlić Street, town Požega (45°19′53″N, 17°40′28″E) (Figure 1, city 3). Collected and submitted 2005 by Z. Korać, Municipal Museum Požega (Korać 2006).

Comment: (ZK) Expected late Middle Ages, between 1300 and 1600 AD.

Z-3576 PU=4 **800 ± 60 BP**
B129

Quadrant A1-R4, 154.78–154.37 m a.s.l. (cal AD 1207–1278, 62.9%).

Z-3577 PU=5 **885 ± 50 BP**
B130

Quadrant C4-R7, 154.46–155.05 m a.s.l. (cal AD 1048–1083, 18.4%; 1150–1222, 46.4%).

Z-3578 PU=16 **770 ± 75 BP**
B135

Quadrant A1-R5, 154.72 m a.s.l. (cal AD 1205–1297, 63.8%).

Stružani Series

Charcoal samples found in the pit fills in prehistoric and medieval site of Vrtlovi, Kućište and Veliki Trstenik, near the village Stružani near town Slavonski Brod (Figure 1, city 3), E Croatia (45°8′30″N, 18°18′13″E). Protective archaeological researches were carried out under the leadership of J. Lozuk, Slavonski Brod Regional Museum, in 2006 and 2007 for the construction of the international road corridor Ve (highway Budapest – Ploče, section Đakovo – Sredanci). Settlements from different periods were discovered: late Bronze, Early Iron Age, Roman period, Middle Ages and Turkish domination of this region (Miklik-Lozuk 2012).

Stružani—Vrtlovi, Kućište, Veliki Trstenik—north

On this site traces of settlements from the Late Iron Age, the Roman period, the Middle Ages and the Ottoman period (16th–17th century) were revealed (Table 1). A total of 800 objects: columns, waste pits, canals, wells, dugout dwellings and numerous waste and working pits were found. The poles properly arranged in a rectangular and suggest that they could be used for lake dwellings. Found traces of Celtic and Roman movable finds (ceramic forms, bracelet, iron knives, ceramic weights, etc.) indicate settlement from the period of the Roman conquest from the 1st century BC to the 1st century AD. Important are the fireplace and bread oven, as well as worthy facilities from the 10th to 12th century (HAG4/2007:104-106).

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Table 1 Radiocarbon dating of samples from Stružani—Vrtlovi, Kućište, Veliki Trastenik—north series.

Lab code	B code	No.	SU	Depth (m)	^{14}C age (BP)	Calibrated range
Z-4083	505	8	60	85.76–85.57	1550 ± 55	cal AD 435–572, 68.3%
Z-4084	506	37	198	86.33–86.06	1315 ± 55	cal AD 657–707, 37.3%
						cal AD 729–772, 31.0%
Z-4085	507	124	408	85.80–85.27	1865 ± 40	cal AD 129–219, 68.3%
Z-4086	508	181	594	85.77–85.54	1950 ± 55	cal AD 5–129, 61.8%
Z-4087	509	134	414	85.78–85.55	645 ± 70	cal AD 1285–1328, 31.4%,
						cal AD 1345–1395, 36.9%
Z-4088	510	74	306	85.48–85.67	485 ± 55	cal AD 1400–1460, 68.3%
Z-4089	511	86	348	85.79–85.58	385 ± 55	cal AD 1449–1529, 44.1%
						cal AD 1580–1623, 24.2%
Z-4090	512	55	122	86.29–86.10	2030 ± 55	101–66 cal BC, 12.3%
						60 cal BC–cal AD 64, 56.0%
Z-4091	513	35	180	85.88–85.71	2260 ± 65	159 cal BC–cal AD 17, 68.3%
Z-4092	525	187	836	85.99–85.77	1915 ± 55	cal AD 65–206, 68.2%
Z-4093	528	184	666	85.56–85.22	2065 ± 55	159 cal BC–cal AD 8, 68.3%
Z-4094	526	2	160	86.10	1260 ± 95	cal AD 667–877, 68.3%
Z-4095	523	168	528	85.69	2025 ± 60	102 cal BC–cal AD 68, 68.3%
Z-4096	527	28	158	86.00–85.87	1285 ± 60	cal AD 661–774, 65.3%
Z-4097	528	200	852	85.71–85.34	2625 ± 55	836–766 cal BC, 61.8%
Z-4098	530	52	118	85.92–85.68	600 ± 55	cal AD 1305–1365, 52.6%
						cal AD 1384–1402, 15.7%
Z-4099	532	105	374	85.75–85.54	2275 ± 60	399–351 cal BC, 28.1%
						291–209 cal BC, 40.2%
Z-4100	531	71	282	85.71–85.49	1680 ± 95	cal AD 250–534, 68.3%
Z-4101	533	229	940	85.76–85.47	2045 ± 55	114 cal BC–cal AD 26, 63.8%
Z-4103	535	111	426	85.64–85.42	225 ± 50	cal AD 1641–1684, 25.2%
						cal AD 1735–1803, 35.4%
						cal AD 1930–. . . , 7.6%
Z-4104	536	174	584	85.79–85.60	2015 ± 50	54 cal BC–cal AD 69, 64.4%
Z-4105	537	223	946	85.51–85.27	1345 ± 55	cal AD 645–702, 45.5%
						cal AD 741–772, 22.8%
Z-4106	545	209	862	85.48–85.33	735 ± 55	cal AD 1227–1299, 68.3%
Z-4107	538	161	500	85.66–85.1	2555 ± 85	806–545 cal BC, 68.3%
Z-4108	546	81	326	85.61–85.29	535 ± 60	cal AD 1324–1354, 24.4%
						cal AD 1393–1437, 43.8%
Z-4109	547	233	1050	85.65–85.43	1540 ± 65	cal AD 435–596, 68.3%
Z-4110	540	232	958	85.83–85.27	2125 ± 55	199–53 cal BC, 62.7%
Z-4112	542	247	996	85.81–85.29	1495 ± 80	cal AD 535–648, 59.1%

Stružani—Vrtlovi, Kućište, Veliki Trstenik—south

Site of dugout dwellings from the Middle Ages and the Ottoman domination (16th–17th century), although the findings of a large number of traces of massive columns arranged in a regular grid can assume (at least partially) the lake-dwelling character of the village (Table 2). A total of 600 objects (traces of columns, waste pits, canals, wells and dugout

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Table 2 Radiocarbon dating of samples from Stružani – Vrtlovi, Kućište, Veliki Trastenik – south series.

Lab code	B code	No.	SU	Depth (m)	^{14}C age (BP)	Calibrated range
Z-4113	548	658	1191	85.67–85.39	1620 ± 55	cal AD 411–538, 68.3%
Z-4114	550	654	1189	85.58–85.31	1450 ± 55	cal AD 575–649, 68.3%
Z-4115	549	586	1075	85.81–85.62	245 ± 55	cal AD 1521–1570, 14.0%
						cal AD 1631–1683, 28.1%
						cal AD 1736–1803, 24.6%
Z-4116	563	697	1205	85.34–84.95	360 ± 50	cal AD 1460–1524, 35.6%
						cal AD 1572–1630, 32.7%
Z-4117	551	532	1055	85.94–85.67	275 ± 55	cal AD 1515–1591, 37.4%
						cal AD 1620–1666, 25.9%
Z-4118	564	569	1095	85.81–85.61	275 ± 50	cal AD 1515–1591, 39.4%
						cal AD 1620–1664, 25.4%
Z-4119	552	649	733	83.26–3.09	185 ± 55	cal AD 1655–1694, 16.4%
						cal AD 1725–1811, 38.1%
						cal AD 1917–…, 13.8%
Z-4120	553	670	1187	85.54–85.34	395 ± 50	cal AD 1444–1515, 50.0%
						cal AD 1590–1620, 18.3%
Z-4121	554	601	1099	85.36–85.04	1335 ± 50	cal AD 650–703, 43.2%
						cal AD 741–772, 25.0%
Z-4122	555	578	1037	85.73–85.49	200 ± 50	cal AD 1651–1688, 18.23%
						cal AD 1730–1807, 38.8%
						cal AD 1925–…, 11.3%
Z-4123	556	555	1063	85.86–85.74	190 ± 50	cal AD 1654–1691, 16.9%
						cal AD 1728–1819, 38.6%
						cal AD 1921–…, 12.6%
Z-4124	560	564	879	85.83–85.45	310 ± 50	cal AD 1504–1597, 52.6%
						cal AD 1616–1645, 15.7%
Z-4125	565	554	1053	85.97–85.73	280 ± 50	cal AD 1515–1591, 41.3%
						cal AD 1620–1663, 25.1%
Z-4126	566	202	268	85.10–85.03	350 ± 50	cal AD 1479–1525, 26.7%
						cal AD 1558–1631, 41.6%
Z-4128	567	523	1057	85.96–85.89	—	Modern sample (100.3 pMC)
Z-4129	569	542	1001	85.76–85.57	250 ± 50	cal AD 1524–1571, 19.0%
						cal AD 1630–1676, 29.9%
						cal AD 1765–1800, 17.0%
Z-4130	572	500	793	85.95–85.47	1195 ± 50	cal AD 773–893, 64.4%
Z-4131	570	486	801	85.78–85.57	405 ± 50	cal AD 1439–1512, 52.6%
						cal AD 1592–1620, 15.6%
Z-4132	575	492	825	85.51–85.29	1250 ± 50	cal AD 680–829, 62.8%
Z-4134	571	504	837	85.94–85.61	285 ± 50	cal AD 1515–1590, 43.4%
						cal AD 1620–1661, 24.9%
Z-4136	579	545	1015	85.87–85.74	—	Modern sample (100.4 pMC)
Z-4137	580	386	679	85.44–85.20	375 ± 50	cal AD 1455–1530, 42.0%
						cal AD 1579–1623, 26.3%
Z-4138	581	426	639	83.49	460 ± 50	cal AD 1414–1471, 68.3%
Z-4141	585	442	727	84.85–84.60	330 ± 50	cal AD 1499–1637, 68.3%

(Continued)

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Table 2 (*Continued*)

Lab code	B code	No.	SU	Depth (m)	^{14}C age (BP)	Calibrated range
Z-4142	589	460	733	85.03–84.86	430 ± 60	cal AD 1423–1505, 58.2% cal AD 1596–1617, 10.2%
Z-4143	599	339	569	85.78–85.54	830 ± 80	cal AD 1157–1277, 63.5%
Z-4145	595	356	601	85.60–85.42	505 ± 60	cal AD 1328–1346, 10.8% cal AD 1395–1451, 57.5%
Z-4146	596	325	520	85.51–85.32	525 ± 60	cal AD 1327–1350, 15.8% cal AD 1395–1443, 52.4%
Z-4147	597	482	743	85.53–85.30	2945 ± 60	1238–1049 cal BC, 65.5%
Z-4148	600	284	458	85.87–85.50	650 ± 60	cal AD 1284–1326, 33.6% cal AD 1352–1394, 34.7%
Z-4149	601	240	322	85.56–85.26	1650 ± 60	cal AD 354–535, 66.4%
Z-4150	603	26	60	85.25 -85.07	300 ± 60	cal AD 1500–1657, 68.3%
Z-4151	604	279	432	85.41–85.33	1020 ± 55	cal AD 988–1048, 42,7% cal AD 1083–1130, 20.6%
Z-4152	605	181	184	85.51–85.27	1480 ± 55	cal AD 561–642, 68.3%
Z-4153	606	256	386	85.10–84.99	1460 ± 55	cal AD 575–645, 68.3%
Z-4154	616	257	384	85.22–85.06	595 ± 55	cal AD 1307–1364, 50.9% cal AD 1385–1405, 17.4%
Z-4155	607	251	382	85.18–85.03	2975 ± 60	1287–1110 cal BC, 66.7%
Z-4156	609	4	58	86.77–86.48	1405 ± 55	cal AD 597–665, 68.3%
Z-4157	620	177	130	83.34–83.04	55 ± 55	cal AD 1695-1735, 18.9 % cal AD 1812-1916, 49.4%
Z-4158	610	9	46	85.45–85.34	3020 ± 60	1386–1339 cal BC, 17.7% 1317–1200 cal BC, 48.1%
Z-4159	611	275	424	85.52–85.37	2140 ± 55	348–319 cal BC, 13.0% 205–54 cal BC, 55.2%
Z-4160	612	221	276	84.43–84.36	830 ± 55	cal AD 1175–1266, 68.3%
Z-4161	613	188	258	85.47–85.26	210 ± 60	cal AD 1639–1694, 21.4% cal AD 1726–1811, 35.4% cal AD 1917–. . . , 11.4%
Z-4162	614	352	374	85.09–84.92	2925 ± 60	1219–1046 cal BC, 65.3%

facilities) were revealed. Recovered material shows poverty typical of a late medieval village (HAG4/2007:102-104).

Slavonski Brod—Ivana Brlić Mažuranić Square Series

Charcoal samples from cremation graves in Roman necropolis found at Ivana Brlić Mažuranić Square, town Slavonski Brod in Slavonia (45°9′47″N, 18°0′42″E). Collected 2006 and submitted by J. Miškiv, Slavonski Brod Regional Museum (Miškiv et al. 2006).

Z-3730 Ivana Brlić Mažuranić Square #1 2405 ± 90 BP
B249

Grave 1, E5, SU042, PV=129 (749–687 cal BC, 14.6%; 666–640, 6.1%; 569–395, 47.4%).

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Z-3731 Ivana Brlić Mažuranić Square #2 2055 ± 70 BP
B251

Grave 4, D7, SU101, PV=310 (167 cal BC–cal AD 25, 68.3%).

Slavonski Brod—Mesićeva Street Series

Wooden samples from the ditch found during protective research in Mesićeva Street No.7, Slavonski Brod. The archaeological material was found in the fill of the moat of defensive walls which was assumed to be built in pre-Turkish period as part of the northern perimeter of the medieval and Turkish town. Wooden poles from palisade walls were destroyed or discarded probably after the departure of the Turks (1691), when the moat was filled, enabling the northward expansion of the town. Horizontally stacked willow branches probably served as a kind of reinforcement of the moat (HAG4/2007:99-101). Samples of branches and wooden poles were collected 2007 by L. Miklik-Lozuk and submitted by I. Bunčić, Slavonski Brod Regional Museum.

Comment: (LMM) Expected Middle Ages.

Z-3959 Mesićeva Street, sample #2 220 ± 50 BP
B430

Quadrant E10, SU 006, 89.27 m a.s.l. (cal AD 1642–1684, 23.4%; 1734–1804, 36.4%; 1929–. . . , 8.5%).

Z-3960 Mesićeva Street, sample #9 190 ± 50 BP
B431

Quadrant C10/C11, SU 006, 89.38 m a.s.l. (cal AD 1656–1693, 16.2%; 1727–1810, 38.8%; 1919–. . . , 13.2%).

Z-3961 Mesićeva Street, sample #26 130 ± 50 BP
B432

Quadrant D10, SU 006, 88.34–88.10 m a.s.l. (cal AD 1684–1735, 19.3%; 1803–1896, 38.0%; 1903–1930, 10.9%).

Slavonski Brod—Fortress Series

Charcoal samples found during protective excavations within the Austrian border fortress constructed between 1715 and 1780. Excavations have revealed the foundations of the entire system of the former headquarters barracks and within that area the remains of older pits proving the evidence of settlements established during the Middle Bronze Age (around 1600 BC) and continued to live with interruptions until the 2nd century BC in the early Iron Age (HAG5/2008:99-101). Samples were collected on two occasions: 2003 (location Weapons Square) and 2008 by L. Miklik-Lozuk and submitted by I. Bunčić, Slavonski Brod Regional Museum.

Comment: (LML) Expected Bronze Age (Litzen culture) and Iron Age (Z-4190 and Z-4191)

Z-3956 Fortress, Weapons Square, sample 28 2185 ± 50 BP
B436

SU 008, quadrant B8, 88.53–87.83 m a.s.l. (359–276 cal BC, 35.9%; 261–244, 5.6%; 234–170, 26.7%).

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Z-3957 Fortress, Weapons Square, sample 61 **3440 ± 45 BP**
B437

SU 016, quadrant C6, 88.33–87.81 m a.s.l. (1874–1845 cal BC, 13.6%; 1818–1801, 6.2%; 1776–1686, 46.7%).

Z-3958 Fortress, Weapons Square, sample 63 **3400 ± 55 BP**
B438

SU 074, quadrant F7, 88.54–87.10 m a.s.l. (1751–1615 cal BC, 64.7%).

Z-4187 Fortress, sample 3 **3415 ± 70 BP**
B615

SU 12/13, 88.95–88.67 m a.s.l. (1769–1625 cal BC, 63.4%).

Z-4188 Fortress, sample 20 **2620 ± 60 BP**
B617

SU 22/23, 88.82–88.37 m a.s.l. (897–868 cal BC, 8.8%; 842–757, 56.3%).

Z-4189 Fortress, sample 34 **2190 ± 60 BP**
B619

SU 16/17, 88.67–88.47 m a.s.l. (361–241 cal BC, 43.5%; 236–171, 24.7%).

Z-4190 Fortress, sample 39 **2270 ± 65 BP**
B627

SU 20/21, 88.46–88.25 m a.s.l. (398–350 cal BC, 24.9%; 304–208, 43.4%).

Z-4191 Fortress, sample 51 **1930 ± 60 BP**
B628

SU 28/29, 88.76–88.37 m a.s.l. (cal AD 23–168, 62.1%; 186–203, 6.2%).

Z-4255 Virovitica **515 ± 50 BP**
B653

Part of the wooden pylon excavated 2–2.5 m deep in the western part of the park surrounding the castle in the center of town Virovitica (Figure 1, city 5), N Croatia (45°49′54″N, 17°23′8″E). At the place of the castle constructed at the beginning of 19th century there was a medieval lowland fortress built between 1453 and 1473, whose buried entrance, parts of the walls, foundations of a tower from the 15th century, and the pylons of the bridge over the moat were found during the investigations (HAG6/2009:144-145). Collected and submitted 2009 by S. Salajić, Municipal Museum Virovitica. (cal AD 1396–1445, 64.4%).

Comment: (SS) Expected beginning of 15th century (Salajić 2010).

Slavča Series

Charcoal samples found in backfill pits taken at prehistoric site Slavča, 1 km N from town Nova Gradiška (Figure 1, city 6) (45°16′30″N, 17°23′00″E) (Skelac 1997). In the excavated area of 380 m^2 life of Late Neolithic (Sopot, Brezovljani type) and Early, Middle and Late Eneolithic (Kostolac and Vučedol) population was found with much ceramic

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material (HAG1/2004:39-41, HAG2/2005:53-55). Samples were collected from 2000 to 2004 and submitted 2010 by M. Mihaljević, Municipal Museum of Nova Gradiška. Previous measurements: Z-3234 (5610 ± 100), Z-3290 (5980 ± 90), Z-3291 (5990 ± 90), Z-3292 (3995 ± 65) (Obelić et al. 2011).

Z-4423 Slavča #1 **4525 ± 75 BP**
B709

Slavča 2000, S1, quadrant H7, SU 22/23, U=11 (3361–3266 cal BC, 25.8%; 3243–3103, 42.5%).
Comment: (MM) Expected Lasinja Culture.

Z-4425 Slavča #3 **3930 ± 85 BP**
B721

Slavča 2002, S1, F/G 7/8, SU 94 (2566–2531 cal BC, 8.5%; 2495–2292, 59.8%).
Comment: (MM) Expected Vučedol Culture.

Z-4427 Slavča #5 **5570 ± 90 BP**
B723

Slavča 2003, S1, F/G 4/5, SU 155, U-151 (4496–4339 cal BC, 68.3%).
Comment: (MM) Expected Sopot Culture.

Z-4428 Slavča #6 **3690 ± 90 BP**
B724

Slavča 2004, S2, C/5, SU 163 (2200–1950 cal BC, 68.2%).
Comment: (MM) Expected Sopot Culture.

Z-4429 Slavča #7 **4565 ± 80 BP**
B725

Slavča 2004, S3, B-1, SU 171, U=190 (3493–3462 cal BC, 7.0%; 3376–3282, 23.6%; 3243–3102, 35.4%).
Comment: (MM) Expected Kostolac Culture.

Bjelovar Series

Dating of graveyard and sacral architecture in Bjelovar-Bilogora County (Figure 1, city 7). Bone and wooden samples collected by G. Jakovljević, Municipal Musem Bjelovar, and submitted in the period from 2009 to 2013 (Jakovljević 2004, 2012).

Z-4417 Novi Pavljani #1 **300 ± 60 BP**
B764

Human bones from probe I, burial XXVII from graveyard near the St. Paul's church in village Novi Pavljani near Bjelovar (45°51′42″N, 16°50′80″E), collected in 2002 and submitted in 2009 (cal AD 1500–1600, 50.1%; 1615–1652, 18.1%).

Comment: Expected 14th to 16th century.

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Z-4418 Novi Pavljani #2 **405 ± 65 BP**
B765

Human bones from probe I, burial XXV from graveyard in village Novi Pavljani (cal AD 1437–1521, 48.7%; 1564–1623, 19.6%).
Comment: (GJ) Expected period 14th to 16th century.

Z-4514 Severin—Orovac Vineyards #2 **3620 ± 75 BP**
B795

Zoological bones from waste pit found in Orovac vineyards near village Severin (45°46′65″N, 16°58′94″E). The aim of excavations at this Prehistoric site has been to detect the construction phases in the settlement (Jakovljević 2004). Quadrant F9/10, SU023, collected in 2010 (2132–2086 cal BC, 12.6%; 2050–1887, 55.7%).
Comment: Expected 2100–1900 BC, Vinkovci Culture.

Z-5022 Severin—Orovac Vineyards #3 **4200 ± 50 BP**
B987

Charcoal from former housing from quadrant 11, SU045, collected in 2012 (2889–2649 cal BC, 19.4%; 2811–2743, 33.8%; 2729–2696, 15.0%).
Comment: (GJ) Expected period: 2100–1900 BC.

Z-4919 Severin—Selište **1310 ± 85 BP**
B913

Burned wooden planks from a building structure at Roman site Severin-Selište (45°50′3″N, 16°58′4″E), collected in 2011 (cal AD 648–775, 58.6%, 790–822, 9.7%).
Comment: (GJ) Expected 4th century.

Z-4389 Donja Vrijeska **590 ± 65 BP**
B761

Anthropological bone material from probe I11, burial I at St. Anne's church in village Donja Vrijeska. (45°38′45″N, 17°16′19″E). Today's monastery church is the remnant of the former Paulin complex consisting of a church and a monastery from 1412 which had belonged to a large feudal estate of Nelipić family (HAG5/2008:171-172). Sample collected in 2008 (cal AD 1305–1365, 48.2%; 1383–1409, 20.1%).
Comment: Expected 15th century (Kašić 1971).

Z-5123 Gornji Križ #2 **980 ± 80 BP**
B1030

Human bone from devastated grave in apse, Holy Cross church at Gornji Križ village near Zrinjski Topolovac (46°2′37″N, 16°46′8″E). Dating of cemetery and sacral architecture. SU006, collected in 2012 (cal AD 1015–1159, 63.8%).

Comment: (GJ) Expected 16th century.

Z-5698 Gornji Križ #3 **370 ± 20 BP**
A1078 $\delta^{13}C = -18.4$ ‰

Human bone from a tomb 11 in apse, depth 1.43 m, collected in 2013. Expected 12th century (cal AD 1466–1510, 42.9%, 1592–1619, 25.3%).

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Z-4504 Slovinska Kovačica **3935 ± 40 BP**
A351 $\delta^{13}C = -22.3$ ‰

Burned human bones found during systematic study of assumed necropolis under tumuli at the SW corner of the NE quadrant of tumulus IV, location Slovinska Kovačica—forest Jasenova in municipality Nova Rača (45°46′66″N, 16°58′87″E). Samples collected in 2010 (2476–2396 cal BC, 45.1%; 2388–2344 cal BC, 23.2%).
Comment: (GJ) The whole inventory found enables the site to be dated, for the first time, to the Bronze Age, but without more detailed determination (HAG7/2010:206-207).

Z-4720 Farkaševac **625 ± 40 BP**
A333 $\delta^{13}C = -20.9$ ‰

Zoological bones in ground under plowing layer from Lazar field in Farkaševac village (45°53′58″N, 16°37′48″E), collected in 2011. Systematic archaeological research on the motorway A13, section Vrbovec – Terezino Polje, subsection Vrbovec—Farkaševac (cal AD 1301–1328, 27.4%; 1345–1370, 23.4%; 1377–1395, 17.5%).

Comment: (GJ) Expected 14th to 16th century.

Z-3920 Sisak—Roman bridge **2145 ± 50 BP**
B412

Wood from pile as the parts of foundations of the Roman bridge over the Kupa River in Sisak (Figure 1, city 8), C Croatia (45°29′6″N, 16°22′23″E). Pile length 7 m, diameter 0.3 m, emerged from the river due to extremely low water level. Sisak, during Roman times known as *Siscia*, was capital of the province Pannonia Savia. An inscribed brick contains information on the possible existence of two harbors of *Siscia* operating on opposite banks of the Kupa River (Rendić-Miočević 2012). Sample collected 2007 and submitted by I. Muhovec, Geotechnical Faculty in Varaždin (349–312 cal BC, 14.6%; 206–94, 47.2%; 75–55, 6.4%).
Comment: (IM) Expected Roman times.

Z-4482 Sisak—Dunavski Lloyd building **2360 ± 55 BP**
B791

Beam, probe 6, quadrant E3, SU 342, excavated during protective archaeological research on the ground of future building of Dunavski Lloyd in town Sisak. The remains of architecture and multitude of movable finds, mostly ceramics, dated from the 4th century BC to 20th century, were found (HAG7/2010:315-318). Sample collected in 2010 and submitted by R. Škrgulja, Municipal Museum Sisak (540–385 cal BC, 68.3%).
Comment: (RŠ) Expected Roman period, 1st century BC.

Sisak—Old Town Series

Wooden samples from the Old Town, late medieval triangle defense fortress in Sisak at the confluence of the Kupa and Sava rivers (45°28′17″N, 16°23′14″E), built from 1544 until 1550 from the bricks of the ancient Siscia to the defense of the Turks. Samples collected 2007 and submitted by I. Baćani, Municipal Museum Sisak by R. Škrgulja, Municipal Museum Sisak, to determine the age and function of wooden architecture and the first level of functioning of fortification with the main entrance.

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Z-3916 Sisak—Old Town #1 **370 ± 55 BP**
B411

Beam, courtyard in Old Town, sample U-1, quadrant A10, SU 85 (cal AD 1456–1523, 39.2%; 1574–1627, 29.1%).

Z-3917 Sisak—Old Town #2 **395 ± 50 BP**
B413

Pile, courtyard in Old Town, sample U-2, quadrant A4, SU 75 (cal AD 1445–1517, 48.9%; 1589–1621, 19.4%).

Z-3918 Sisak—Old Town #3 **365 ± 50 BP**
B414

Pile, courtyard in Old Town, sample U-3, quadrant A4/10, SU 207 (cal AD 1460–1522, 37.8%; 1575–1626, 30.5%).

Sisak—St. Quirinus church Series

Wooden samples from St. Quirinus church in Sisak. Collected and submitted 2008 by T. Tomaš, Municipal Museum Sisak. Archaeological research, as the part of the project "St. Quirinus Archaeological Park", confirmed the previously known multilayered stratigraphy of the site where five stratigraphic phases were defined, from the oldest, belonging to the 1st century AD, to the most recent phase, to which the demolished Baroque chapel of St. Quirinus belongs (HAG7/2010:318-322).

Z-4258 Sisak—St. Quirinus U-19 **1385 ± 85 BP**
B655

Wooden pole/pile from the church, SU 323, quadrant C2 (cal AD 586–702; 56.3%; 741–772, 12.0%).

Z-4261 Sisak—St. Quirinus U-18 **2110 ± 40 BP**
B659

Wooden pole/pile from the church, SU 304, quadrant C12 (198–47 cal BC, 65.3%).

Banovina Series

Several fortifications built in Banovina region (Figure 1, city 9), the strategically important area between the Sava, Kupa and Una Rivers, C Croatia, by the Chapter of Zagreb in the 16th century as the first defense line against Turkish attacks from Bosnia (Kruhek 1995).

Z-4632 Klinac Grad—beam from doorpost **905 ± 55 BP**
B752

Beams from the doorpost at the entrance to the medieval fortress Klinac Grad, 8 km south of town Petrinja, C Croatia (45°22′12″N, 16°18′0″E), 335 m a.s.l. The fortress consists of a pentagonal tower with loopholes typical for 15th and 16th century. Collected and submitted 2010 by Z. Franić, Institute for Medical Research and Occupational Health, Zagreb (cal AD 1046–1084, 21.3%; 1124–1213, 43.7%).

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Z-5021 Klinac Grad—loophole, beam **275 ± 50 BP**
B986

Typical loophole for 15th and 16th century (cal AD 1519–1587, 36.5%, 1622–1665, 27.3%).

Z-5927 Pecki **435 ± 70 BP**
B1299

Wood, chessnut (*Castanea sativa*—determined by R. Laginja, Faculty of Forestry) from the southern exterior wall of the fortification Pecki, 2.2 m above today's ground level. The fortification was built in the middle 16th century and first mentioned in 1563 (cal AD 1414–1510, 57.2%, 1593–1619, 11.1%).

Ivanja Reka Series

Wooden pylons found 50–100 m deep at the bank of the Sava River, downstream and east from Zagreb (Figure 1, city 10), between settlements Ivanja Reka and Ščitarjevo (45°47′18″N, 16°7′16″E). It is possible that some of them originate from ancient times because of nearby remnants of the Roman town *Andautonia*. Collected and submitted 2008 by K. Zubčić, Department of Underwater Archaeology of the Croatian Restoration Institute.

Z-4235 Ivanja Reka #1 **1935 ± 60 BP**
B591

Pylon, probably oak, N bank of the Sava River close to the highway bridge at Ivanja Reka. Ancient pottery found in vicinity (cal AD 22–168, 62.3%, 186–203, 6.0%).
Comment: (KZ) Expected 100–300 years or Antique.

Z-4236 Ivanja Reka #2 **340 ± 55 BP**
B592

Pylon, probably oak, S bank of the Sava River downstream from the highway bridge at Ivanja Reka.

Comment: Expected 100–300 years (cal AD 1480–1528, 24.9%; 1551–1634, 43.4%).

Z-4237 Ivanja Reka #3 **2200 ± 60 BP**
B593

Part of possible wooden pylon, probably coniferous, found in a gravel pit near the Sava River close to the highway bridge at Ivanja Reka (361–176 cal BC, 68.3%).

Comment: (KZ) Expected 100–300 years.

Veliki Tabor Series

Veliki Tabor (Figure 1, city 11) is a medieval town near Desinić in Hrvatsko Zagorje, NW Croatia (46°9′9″N, 15°39′14″E). Its first tower was built in the 12th century, the other two in the 15th and the 16th century, while the present look of the castle dates back to 1820. It was owned by the Counts of Cilli (Celje), Matthias and Johannes Corvinus, since 1502 by the Rattkay family, and today is a museum. As a representative medieval fortress, it turned into a castle in the 17th and 18th centuries but has maintained its late Gothic forms and architectural composition (HAG3/2006:153-157). Archaeological and conservation-restoration research were conducted by the Croatian Conservation Institute and cooperators in the period 1995–2011 along with the rehabilitation of the castle which included the renovation of

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exteriors and interiors of the *Palais*—the central and oldest part of the castle. Samples submitted 2009 by I. Stjepčević, Ing-grad Ltd., Zagreb.

Z-4262 Veliki Tabor #1 **285 ± 45 BP**
B649

Wooden beam from the roof of the *Palais* (cal AD 1516–1590, 43.3%; 1621–1661, 25.0%).
Comment: (IS) Expected 500 years.

Z-4263 Veliki Tabor #2 **515 ± 50 BP**
B661

Charcoal from fireplace, SU 018, probe A, quadrant 3 (cal AD 1397–1446, 65.2%).
Comment: (IS) Expected 600 years.

Z-4264 Veliki Tabor #3 **1020 ± 50 BP**
B662

Charcoal from fireplace, SU 004/005, probe A, quadrant 3 (cal AD 979–1047, 48.4%; 1083–1127, 17.0%).
Comment: (IS) Expected 600 years.

Z-4265 Veliki Tabor #4 **435 ± 35 BP**
B660

Wooden beam, SU 023/024, probe A, quadrant 3 (cal AD 1433–1474, 68.3%).

Comment: (IS) Expected 600 years.

Z-4266 Veliki Tabor #5 **650 ± 50 BP**
B663

Charcoal from fireplace, SU 045, probe A, quadrant 2 (cal AD 1287–1324, 32.9%; 1355–1393, 35.3%).

Comment: (IS) Expected 600 years

Veliki Tabor "Veronika" Series

The chronicles of the Counts of Cilli record that Veronika of Desenice (Desinić), the second wife of Frederick II, was accused by her father-in-law Hermann II of witchcraft and executed in 1425. According to a legend, she was drowned in a barrel of water and bricked into the wall connecting the walls of the pentagonal tower with the entrance area of Veliki Tabor castle. During the cleaning of the castle in 1982 a skull belonging to a female person was found. There is no evidence that the recovered skull and strands of hair belong to unfortunate Veronika, as proven by the results of the ^{14}C analyses. Samples were submitted in 2012 by N. Jagarčec, Museums of Hrvatsko Zagorje County.

Z-5065 Veliki Tabor—scull "Veronika" **200 ± 40 BP**
A572 $\delta^{13}C = -15.7$ ‰

Skull was found in the tower C (chapel) of the castle Veliki Tabor (cal AD 1655–1684, 17.5%; 1735–1803, 41.1%; 1930–. . . , 9.7%).

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Z-5066 Veliki Tabor—hair "Veronika" **190 ± 40 BP**
A571 $\delta^{13}C = -18.0$ ‰

Strands of hair found in the opening between the stones in the connecting wing of the castle (cal AD 1660–1686, 14.8%; 1733–1805, 41.6%, 1928–. . . , 11.7%).

Z-4480 Samobor—water mill **320 ± 55 BP**
B754

The basis of the pilot from the remains of the water mill in village Bobovica close to the town of Samobor (Figure 1, city 12) (45°49′32″N, 15°42′54″E). Collected and submitted 2010 by J. Horvat, Atest Horvat Enterprise, Samobor (cal AD 1500–1600, 53.9%; 1615–1642, 14.4%).

Comment: (JH) Expected age 300 years.

Karlovac Series

Wooden samples found during excavations in central part of the town Karlovac (Figure 1, city 13) called *"Zvijezda"* (star), C Croatia (45°29′34″N, 15°33′19″E), the old fortification whose foundations started on July 13, 1579, by the decision of the Austrian Archduke Charles (Croatian: Karlo) to protect against the Turkish conquest. The town was built on the idea of an ideal Renaissance city in the form of a six-pointed star with a central square and streets intersecting at right angles (Kruhek 1979). Archaeological research was undertaken at the place of the former "Banska vrata" (Viceroy Gate) on the northern entrance to the *Zvijezda*, whose remains were observed during construction works on new sewer lines in the center of the town. Collected 2005 by J. Peković and submitted by Ž. Peković, Omega Engineering Ltd., Dubrovnik (HAG 2/2006:184-187).

Comment: (ŽP) Expected 16th century.

Z-3568 Karlovac—Zvijezda #1 **335 ± 45 BP**
B112

Sample S-1, SU 74, 110.41 m–110.15 m a.s.l., Pavleka Miškine Str. in Karlovac (cal AD 1490–1528, 20.9%; 1548–1634, 47.4%).

Z-3569 Karlovac—Zvijezda #2 **395 ± 30 BP**
B113

Sample S-3, SU 113, 110.59 m, Pavleka Miškine Str. in Karlovac (cal AD 1449–1500, 56.0%; 1600–1615, 12.3%).

Z-4241 Karlovac—Dubovac **280 ± 40 BP**
B634

Wood (pole) from the ramparts of the castle Dubovac near Karlovac (45°29′51″N, 15°31′48″E) found during restoration works in 2004. The castle was probably built during the 13th century, in the 15th century rebuilt in renaissance style and in 19th century in the spirit of romanticism. Below the square tower and layers of later built basement area there was defined a medieval moat and its filled layers with the findings of fragments of prehistoric and mediaeval pottery were explored (HAG1/2004:129-130). Further works were suspended because of newly discovered static problems and lack of resources and were continued in 2009 (HAG7/2010:343-346). Collected and submitted 2008 by R. Huljina, AB Gradnja Ltd., Karlovac (cal AD 1521–1578, 40.1%; 1624–1661, 28.2%).

Comment: (RH) Expected Middle Ages.

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Kamensko Series

Archaeological research in Kamensko near Karlovac (45°28′33″N, 15°36′27″E) performed in the context of reconstruction and restauration of the Church of the Virgin Mary of the Snow and Pauline monastery complex located on a slightly elevated strategic position next to the Kupa R, suitable for settlement since prehistoric times. According to the finds there was a Bronze Age settlement at this territory (pottery fragments with plastic garlands typical for Urnfield cultures) and the settlement existed through the early and late Iron Age and Antiquity to the late Middle Ages (HAG3/2006:211-212). The number of stages from the time the existence of the church and monastery with accompanying cemetery were found. Prehistoric charcoal samples collected 2006 and submitted 2007 by A. Azinović Bebek, Croatian Restoration Institute, Zagreb (Azinović Bebek and Pleše 2006).

Comment: (AAB) Expected Urnfield culture (Bronze Age), ~2500 years.

Z-3840 Kamensko #2 **2380 ± 90 BP**
B369

SU 18, trench-pit (749–685 cal BC, 16.8%; 667–639, 7.3%; 570–409, 43.2%).

Z-3842 Kamensko #3 **2595 ± 65 BP**
B371

SU 5 (828–749 cal BC, 43.6%; 686–667, 6.3%; 639–570, 18.4%).

Z-3843 Kamensko #4 **2575 ± 65 BP**
B368

SU 3, G22 (810–748 cal BC, 34.2%; 688–666, 8.4%; 642–567, 25.7%).

Z-3844 Kamensko #5 **2920 ± 70 BP**
B351

SU 16, S2D, grave (1214–1016 cal BC, 68.3%).

Z-3845 Kamensko #6 **3020 ± 55 BP**
B360

SU 16, S2E, grave (1386–1339 cal BC, 17.7%; 1317–1202, 49.1%).

Z-3914 Mrežnica River bridge **200 ± 50 BP**
B395

Pilon of wooden bridge over the river Mrežnica in the village Sv. Petar Mrežnički, Duga Resa, C Croatia (45°26′4″N, 15°29′53″). The pilon was driven 3 m in riverbed, and part over the riverbed was taken for dating. Collected 2006 by K. Zubčić, Croatian Conservation Institute (cal AD 1650–1688, 18.3%; cal AD 1730–1807, 38.7%; 1925–. . . , 11.3%).

Vukava Series

Samples from site Karaula, a hill between Vukava and Ruda Glavica near Široka Kula in Lika Region (Figure 1, city 14), C Croatia (44°37′26″N, 15°28′30″E). The hillfort was described by Drechsler-Bižić (1986). Collected 2008 and submitted by T. Kolak, Regional Museum of Lika in Gospić.

Comment: (TK) Expected Japodic culture, 2700 years old.

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Z-4250 Vukava #1 **2820 ± 50 BP**
B652

Charcoal from a residential object, quadrant 1, SU 8, 726.11 m a.s.l. (1047–906 cal BC, 68.3%).

Z-4251 Vukava #2 **2470 ± 55 BP**
B689

Apple seeds from quadrant 2, SU 5, 725.97 m a.s.l. (758–516 cal BC, 68.3%).

Udbina Series

Medieval archaeological site Gradina (Hill 849) at northern edge of the hill on which the present village Udbina (44°31′52″N, 15°45′57″E) is built. Research within the remains of the medieval tower where in the layer of loose plaster a considerable amount of the archaeological material from the late Middle Ages was found (HAG 6/2009:487-8, HAG7/2010:500-502). Charcoal collected 2008 and submitted by T. Kolak, Regional Museum of Lika, Gospić.

Comment: (TK) Expected age 500 years.

Z-4248 Udbina—Gradina #1 **585 ± 50 BP**
B646

Charcoal from support beam, quadrant 1, SU 11, 838.54 m a.s.l. (cal AD 1309–1362, 48.9%; 1386–1408, 19.3%).

Z-4249 Udbina—Gradina #2 **575 ± 50 BP**
B647

Charcoal from support beam, quadrant 1, SU 12, 838.24 m a.s.l. (cal AD 1314–1361, 44.0%; 1387–1415, 24.3%).

Uzdolje—Grablje Series

Human bones found during excavations of graves at site Grablje, village Uzdolje in Kosovo Polje field, S of town Knin (Figure 1, city 15), C Dalmatia (43°58′49″N, 16°12′18″E). The site has dominant position on a mound and its toponym Grablje indicates cemetery, or a surface covered with graves. Beneath the graves at the top of the slopes an older funerary architecture is visible. The goal of dating was to determine whether the older graves were disturbed with new burials (HAG3/2006:380-382; Gugo Rumštajn 2007). Discovered material was mostly of the post-medieval origin. Analysis of coins confirmed that the finds belonged to the period of the first Austrian administration (1797–1805). Collected and submitted 2006 by K. Gugo Rumštajn, Museum of Knin.

Comment: (KGR) Expected 300 years or older.

Z-3781 G27 **410 ± 80 BP**
B317

Grave 27, quadrant L 12 (cal AD 1429–1522, 46.6%; 1575–1625, 21.7%).

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Z-3783 G26 **185 ± 75 BP**
B321

Grave 26, above G24, quadrant 11/12 (cal AD 1654–1696, 14.1%; 1724–1812, 31.1%; 1838–1878, 11.2%; 1915–. . . , 11.9%).

Z-3784 G4 **170 ± 50 BP**
B330

Grave 4, quadrant H 13 (cal AD 1665–1695, 12.4%; 1725–1785, 25.4%; 1794–1812, 6.9%; 1852–1877, 7.6%; 1916–. . . , 14.1%).

Z-3785 G144 #6 **340 ± 50 BP**
B331

Grave 14, quadrant M 12 (cal AD 1487–1634, 68.3%).

Coastal Croatia

Pula—Kandlerova Street Series

Samples collected during protective archaeological excavations in Kandlerova Street in Pula (Figure 1, city 16), Istria, W Croatia (44°52′0″N, 13°50′58″E), in St. Theodore district near the northern city gates. The foundations of the Benedictine convent were found, as well as the rests of the 15th century church of St. Theodore in whose foundations the late ancient church of St. Lucy was discovered. To the period of late Antiquity belongs a polyvalent complex erected on the ruins of first public baths *(thermae publicae)* in Roman Pula and an opulent private house *(domus)* from the period 1st century BC–5th century AD. Hundreds of graves around the medieval church were found, together with more than 1000 wine amphorae (HAG2/2005:235-238). Collected and submitted 2005 by A. Starac, Archaeological Museum of Istria, Pula (Starac 2009).

Z-3542 Pula—Kandlerova #1 **170 ± 45 BP**
B97

Wood, part of beam, block 16, location 11, SU 24-P7-07 (cal AD 1663–1695, 14.2%; 1725–1787, 29.5%; 1793–1812, 8.2%; 1917–. . . , 15.4%).

Comment: (AS) Expected 5th to 19th century.

Z-3590 Pula—Kandlerova #2 **1850 ± 35 BP**
B132

Burned layer next to the fireplace, SU 43-P24-07 (cal AD 130–143, 8.4%; 156–238, 59.8%).

Comment: (AS) Expected Late Roman times, 400–500 AD.

Z-4372 Poreč—Radi **1430 ± 45 BP**
B679

Charcoal U-9, SU 023, quadrant E2 found at the ancient object of unknown purpose during protective archaeological investigation conducted at the location Radi—VU 303 near the village of Garbina (45°13′4″N, 13°37′10″E), SE of the town Poreč (Figure 1, city 17), Istria, W Croatia. The investigation started after a large number of *tegulae* and *imbrices* were observed at the site during the survey of a section of a future gas pipeline (Šalov 2010). Collected 2009 and submitted by T. Šalov, Archaeological Museum of Istria, Pula (cal AD 597–652, 68.3%).

Comment: (TŠ) Expected Late Roman period, 2nd to 4th century AD.

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Poreč Series

Charcoal found in the late ancient tower (NE town gate) in an amphora from North Africa in city of Poreč. Amphora was laid in the floor, which was created after the partial negation of the gate. Collected and submitted 2008 by M. Uhač, Conservation Department in Pula.

Comment: (MU) Expected 3th to 5th century AD, 1700 years old.

Z-4017 Poreč #1 **1810 ± 40 BP**
B519

Charcoal, sector 2, SU 089 (cal AD 210–255, 39.4%; 285–325, 28.9%).

Z-4018 Poreč #2 **1710 ± 40 BP**
B520

Charcoal and charred seeds, sector 2, SU 063 (cal AD 259–280, 15.2%; 333–405, 53.1%).

Z-4195 Umag—Zambratija **2950 ± 65 BP**
B626

Wood from bracket of a ship found accidentally in Zambratija bay, 2.20 m below sea level, near town Umag (Figure 1, city 18), Istria, W Croatia (45°28′22″N, 13°30′26″E). Collected and submitted by I. Koncani Uhač, Archaeological Museum of Istria (1260–1053 cal BC, 68.3%).

Comment: (IKU) Expected Histrian culture (2nd to 1st century BC).

Z-3616 Omišalj—Mohorov **1195 ± 50 BP**
B189

Charcoal from sector I/2, SU 2.1008, unit 2.108, 60 cm deep from late Antique complex at the site Mohorov, cove Blatna between Omišalj and Njivice, Krk Island (Figure 1, location 19) (45°10′47″N, 14°32′15″E) (Jarak 2000). The site was marked as an Early Christian church, but excavations revealed that it could be labeled as a rural structure dating from the Late Antiquity. Pottery finds date from the end of the 5th century to the end of the 7th century. The shortage of material from the High Middle Ages argues that the buildings in its original purpose were abandoned and have become a refugee of the local population, as confirmed by two fireplaces (HAG 2/2005:268-270). Sample from the small fireplace was collected and submitted 2005 by M. Čaušević-Bully, Association for Archaeological Researches and Promotion of Kvarner Archaeology (aIPAK), Omišalj. Objective of dating is determination of abandonment of the site in early Middle Ages (cal AD 773–893, 66.0%).

Comment: (MČB) Expected very late Antiquity.

Z-3707 Njivice—Poje **1570 ± 50 BP**
B239

Charcoal from fireplace, probe 2, layer 2003/2013, at the site Poje near Njivice, Krk Island (45°9′52″N, 14°32′41″E). In 2005 remnants of a Roman *villa rustica*, dating from 2nd to 3rd century AD, was found with material proofs of life in later stages of the Antiquity and Early Middle Ages. Inside there was probably an early Christian or perhaps early Middle Ages church. In the corner of one of the rooms of the *villa* a little hearth and traces of fireplace were found (HAG3/2006:300-301) where charcoal sample was taken for analysis and submitted 2006 by M. Čaušević-Bully. Objective of dating: time of leaving or destruction of the original flooring (cal AD 433–549, 68.3%).

Comment: (MČB) Expected Early Middle Ages.

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Z-3639 Pag—Caska **2155 ± 40 BP**
B198

Wooden plank under the anchor (probe No. 3) found a few centimeters below the seabed, Caska bay near Novalja on the Pag Island (Figure 1, location 20), N Dalmatia (44°33′3″N, 14°55′11″E). Important remains of a settlement dating from the Antiquity Period were found on mainland and in the shallow sea in the cove, considered to be the remains of the Roman settlement called *Cissa* which had also been the name of the Island of Pag up to the 14th century. Underwater excavations discovered an almost entirely preserved Roman wooden anchor, which is a unique find in Croatia (HAG2/2005:286-287). Collected in 2005 by I. Radić Rossi, Croatian Conservation Institute. (349–311 cal BC, 20.0%; 206–107, 48.2%).

Comment: (IRR) Expected Antiquity period, 2nd century AD.

Z-4652 Monastery of St. Michael, Zadar **645 ± 45 BP**
B806

Part of the beam above the window at St. Michael monastery in old part of town Zadar (Figure 1, city 21), C Dalmatia (44°7′10″N, 15°13′53″E). Submitted 2010 by M. Barun, vicar of the Monastery, during conservation works at the monastery and church dating from the 12th century (cal AD 1291–1342, 30.8%; 1355–1393, 37.4%).

Pakoštane—Solana Series

Dating of underwater samples from Pakoštane Solana, Zadar County (43°54′26″N, 15°30′32″E), C Dalmatia, collected 2005 by M. Jurišić, Department of Underwater Archaeology of the Croatian Conservation Institute. Remains of the Antique harbor and salt pens have been discovered, as well as sunken ship (Z-3452, -3453, Obelić et al. 2011)

Z-3622 Board/plank no. 1 **1890 ± 50 BP**
B190

(cal AD 83–97, 6.4%; 113–221, 61.9%)

Z-3623 Pylon no. 1 **2010 ± 40 BP**
B194

(46 cal BC–cal AD 30, 57.0%, 41–60, 11.3%)

Z-3624 Pylon no. 2 **1990 ± 55 BP**
B195

(37–14 cal BC, 15.3%; cal AD 4–76, 52.9%)

Kaštel Sućurac Series

Submarine survey for obtaining the necessary permits for the construction of new mooring in Kaštel Sućurac was performed along the whole area of the harbor in Kaštel Sućurac, Kaštela Bay near town Split (Figure 1, city 22) (43°32′50″N, 16°25′36″E). The area consists of the remains of the ancient economic complex which was most probably the harbor of ancient *Salona*, capital of Roman Dalmatia (Radić Rossi 2008). Samples were collected and

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submitted by I. Radić Rossi, Department of Underwater Archaeology of the Croatian Conservation Institute, Zagreb.

Z-3640 Kaštel Sućurac—Trstenik #1 **1960 ± 50 BP**
B202

Pylon A from probe A2 found during underwater research in eastern end of Kaštel Sućurac. Investigations in the shallow sea at the mouth of the Trstenik creek into the sea noticed several ceramic *dolia* (drums) about 1000 L of volume. After the entire *dolia* had been extracted, an architectural structure made of amphorae of the Dressel 20 type and pylons of unidentified function was found (HAG2/2005:360-362) (37–14 cal BC, 15.3%; cal AD 4–76, 52.9%).

Comment: (IRR) Expected Roman Empire.

Z-3641 Kaštel Sućurac—Trstenik #2 **1995 ± 35 BP**
B201

Pylon B from probe A2 (41 cal BC–cal AD 66, 68.3%).

Z-3787 Kaštel Sućurac—shipwreck **2005 ± 60 BP**
B287

Wood from the construction of an about 12 m long sunken ship found 1.5 to 2 m deep in the sea, at the site Trstenik in Kaštel Sućurac. The hull was filled with crushed stone and intentionally sunken along linear outer edge of the wooden construction. Around the ship in several places encountered wooden pylons. The best-preserved parts were the ribs at the very bottom of the ship's construction (HAG4/2007:456-458) (51 cal BC–cal AD 83, 62.7%; 97–114, 5.6%).

Comment: (IRR) Expected Roman Empire.

Z-3788 Kaštel Sućurac—pylon **1950 ± 55 BP**
B285

Vigorous survey in the area in front of the parish church observed a large quantity of wooden pylons of diameter of about 20 cm and 50 cm long, similar to the construction other ancient commercial complexes recorded in the Kaštela Bay. One pylon was extracted (cal AD 8–130, 61.2%).

Comment: (IRR) Expected Roman Empire.

Split—Špinut Series

Pylons from the sunken remains of the ancient port and economic complex in small port Špinut at the N part of the city of Split (Figure 1, city 22), (43°28′60″N, 16°25′60″E). The excavation discovered a port construction, outlined by a row of more than 200 wooden pylons. The area inside the construction is partially filled with globular Hispanic amphorae of the Dressel 20 type, arranged in at least two layers. Larger quantity of the movable finds mostly belongs to the 3rd and 4th centuries was found at the area of probe 1 (HAG3/2006:440-442). Parts of pylons were collected 2006 by I. Radić Rossi.

Comment: (IRR) Expected Roman Empire.

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Z-3789 Pylon No. 62 **2015 ± 55 BP**
B286
(54 cal BC–cal AD 77, 63.9%)

Z-3790 Pylon No. 224 **2080 ± 55 BP**
B301
(171–38 cal BC, 62.9%; 13 cal BC–cal AD 3, 5.3%).

Split—Vranjic Series

Rescue archaeological investigations conducted on the Vranjic Peninsula between Split and Solin (43°31'54″N, 16°27'48″E) within the context of the development of the sewage system. In addition to the expected late Roman and early Byzantine material, the unexplored seabed along the coast of the peninsula demonstrated the existence of cultural layers from the prehistoric times, antiquity and the early Middle Ages. The remains of a stone mound built of ancient stone materials after antiquity and surrounded by wooden pylons for strengthening the stone material were found. Between stone material at the site a larger number of remains of stone sarcophagi was found within stone material, suggesting a longer interruption of settlement or a complete change of the local population, to whom ancient stone graves did not represent any value (HAG4/2007:541-543). Samples were collected 2006 by I. Radić Rossi.

Z-3642 Split—Vranjic #1 **1800 ± 40 BP**
B215

Bones, S shore of Vranjic (cal AD 212–259, 32.9%; 280–331, 35.4%).

Comment: (IRR) Expected Bronze age.

Z-3643 Split—Vranjic #2 **3120 ± 60 BP**
B205

Wood near the bones, S shore in Vranjic (1448–1370 cal BC, 39.8%; 1356–1296, 28.5%).

Comment: (IRR) Expected Bronze age.

Z-3644 Split—Vranjic #3 **1340 ± 35 BP**
B200

Beam from the millstone, S shore in Vranjic (cal AD 650–683, 47.0%; 744–761, 17.4%).

Comment: (IRR) Expected Antique

Z-3645 Split—Vranjic #4 **2570 ± 55 BP**
B199

Pylon in profile from S shore in Vranjic (808–750 cal BC, 38.8%; 685–667, 8.0%; 636–588, 18.9%).

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Z-3687 Split—Vranjic #5 **1340 ± 50 BP**
B230

Pylon No.1 found 1.5 to 2 m deep at the S shore in Vranjic (cal AD 649–691, 39.6%; 741–772, 25.4%).

Comment: (IRR) Assumed/expected same age of all 3 pylons Z-3687 to Z-3689

Z-3688 Split—Vranjic #6 **1415 ± 50 BP**
B231

Pylon No.2 (cal AD 603–657, 68.3%).

Z-3689 Split—Vranjic #7 **1280 ± 50 BP**
B232

Pylon No.3, (cal AD 671–772, 68.3%).

Z-3686 Split—Vranjic #8 **3010 ± 50 BP**
B228

Wood from prehistoric layer with prehistoric ceramic sherds, 3.5 m deep at the SE shore of Vranjic. (1379–1346 cal BC, 11.7%; 1305–1195, 48.3%).

Split—Harbor Series

Pylons from coastal construction found during reconstruction of main waterfront (*riva*) in town Split (43°30'27"N, 16°26'12"E). The rescue archaeological investigations performed at the central part of the waterfront, in front of the facade of Diocletian's Palace, determine basic historical phases of quai structure starting from the Late Roman Republican area and going to the Venetian period (HAG 4/2007:513-517), while western part covered the remains of the Venetian Castello from the first half of the 15th century, a retaining wall along the line of the Venetian shoreline and the pier "Mali mol" (Small Mole), assumed to have been built between 16th and 17th century (HAG4/2007:517-521; Čerina 2009). Collected 2006 by V. Delonga, Croatian Conservation Institute.

Comment: (VD) Expected Roman period.

Z-3846 Split—central sea shore #1 **1790 ± 55 BP**
B363

Parts of pylon #22 from sector I, P38-P37 (cal AD 210–265, 27.6%; 273–350, 40.7%).

Z-3847 Split—central sea shore #2 **1660 ± 50 BP**
B349

Parts of pylon #44 from sector I, P33-P34 (cal AD 261–277, 6.6%; 340–436, 50.3%; 516–530, 5.1%).

Stari Grad—Remete Series

According to Diodorus of Sicily, the first urban settlement of Greeks at the eastern part of the Adriatic Sea was Faros, established 385 BC by setters from the Greek island of Paros on the area of today's Stari Grad on Hvar Island (Figure 1, city 23) (43°11′2″N, 16°35′57″E). Conservation rescue works were carried out on the part of old walls alongside the eastern

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city walls of Faros, at the site Remete Garden (HAG6/2009:668-670) in which remains of Greek architecture and the defensive walls of the Greek were found. At the same time, rescue archaeological research inside Remete House (HAG6/2009:670-673) were carried out in order to arrange the space for the location of the Agency for the Management of the old Greek plain *(ager)* from 3rd century BC, inscribed on the UNESCO World Heritage list. Excavations have revealed a settlement three centuries older than believed earlier. Investigations were carried out by Municipal Museum of Stari Grad staff and samples were submitted on three occasions between 2009 and 2011 by S. Popović.

General comment: (SP) The result shows that there was a settlement in this area before the Greek period (probably Illyrians, Delmatic group), but due the burnt layer which was found it can be supposed that the Greeks did not took power over the settlement peacefully.

Comment: (SP) Iron Age (Delmatic group), about 2600 years old.

Z-4284 Remete house #1 **2640 ± 40 BP**
B618

Charcoal SGRK-15A, complex E, SU 15a, in soil without vegetation inside the house built on the remains of the walls of the city Faros (831–785 cal BC, 68.3%).

Z-4285 Remete house #2 **2385 ± 65 BP**
B629

Charcoal SGRK-24A, complex E, SU 24a, layer above Z-4284 (731–699 cal BC, 8.2%; 545–392, 56.8%).

Z-4629 Remete Garden #1 **855 ± 40 BP**
B809

Human bone SGRV10-GRAVE6 found 2010 in the cemetery surrounding the Early Christian double church (cal AD 1159–1230, 62.6%; 1245–1256, 5.7%).

Comment: (SP) Expected Middle Ages.

Z-4631 Remete Garden #3 **2430 ± 40 BP**
B808

Charcoal from a board SGRV10-07-303 found 2010 in the garden (729–700 cal BC, 10.0%; 545–411, 53.9%).

Z-4856 Remete Garden #4 **2450 ± 25 BP**
A481 $\delta^{13}C = -27.2$ ‰

Charcoal SGRV11-03 from a board found 2011 in the Remete garden, complex D2, sample 282a (cal BC 747–689, 25.2%, 665–644, 9.2%, 563–476, 31.8%).

Z-4857 Remete Garden #5 **2710 ± 90 BP**
B903

Charcoal SGRV11-04 from a board found 2011 in the Remete garden, remnants of the burnt antique house, complex D2, sample 282a (cal BC 979–950, 8.0%; 937–795, 60.3%).

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Z-3954 Hvar—Old Theatre **445 ± 50 BP**
B397

Spruce or fir wood from the Old Theater in town Hvar on Hvar Island, C Dalmatia (43°10′13″N, 16°26′28″E). The theater was built in 1612 on the first floor of the Arsenal built in 13th century and represents a monument of the highest national importance in Croatia. Collected and submitted in 2007 by I. Stjepčević, IS-Projekt Ltd. (cal AD 1420–1483, 68.3%).

Comment: (IS) Expected 400 years.

Z-4653 Hillfort Rat **3315 ± 75 BP**
B803

Charcoal sample from probe 1, SU 14.000, collected in one place of the layer at the relative depth of 190 cm, Illyrian hillfort Rat in the vicinity of a deep bay Vičja Luka near the village Ložišća on Brač Island (Figure 1, city 24), central Dalmatia (43°20′58″N, 16°27′51″E). The remains of the late Bronze and Iron Age, a necropolis of graves on the flat surface and the presence of a high number of potsherds from vessels of Greek and South Italic Geometric pottery styles have been found. Sample collected 2008 and submitted 2010 by V. Barbarić, Department of Art History, Faculty of Philosophy, Split (HAG5/2008:576-577, Barbarić 2010) (1685–1651 cal BC, 10.6%; 1645–1505 cal BC, 57.7%).

Comment: (VB) Expected Bronze or Iron age, 2500–3500 yr.

Vela Spila Series

Charcoal samples. Vela Spila cave is located on the S slope of the hill Pinski Rat, at 130 m above the bay of Kale in municipality Vela Luka on Korčula Island (Figure 1, location 25), S Dalmatia (42°58′9″N, 16°43′10″E). Due to its size and excellent location the cave has been constantly inhabited since the last ice age by the end of the Bronze Age, and occasionally since nowadays (Table 3). In 1986 the remains of two adults from the late Neolithic period were discovered. The cave has been systematically investigated since 1974 with the participation of dozens of Croatian and foreign research institutions and prominent individuals (Čečuk and Radić 2005; Lightfoot et al. 2011). Collected and submitted 2008 by D. Radić, Center for Culture Vela Luka.

Comment: (DR) Expected ages from Late Palaeolithic (16,000 years) to Mesolithic (8000 years).

Samples from Art Works

Rab Cathedral

Cathedral of the Assumption of the Blessed Virgin Mary in town Rab, island Rab (Figure 1, city 26), N Adriatic (44°45′16″N, 14°45′37″E). Probably built in the 4th century as the early Christian church and later rebuilt in the Romanesque style and consecrated during visit by Pope Alexander III in 1177. Samples submitted 2005 by M. Domijan, Croatian Conservation Institute, Zagreb.

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Table 3 Radiocarbon dating of samples from Vela Spila series.

Lab code	No.	Quadrant	Layer	^{14}C age (BP)	Calibrated range	Other measurements
Z-3986 B439	1	2	4	8200 ± 70	7323–7077 cal BC, 68.3%	*
Z-3987 B440	2	7	41	16200 ± 120	17864–17445 cal BC, 68.3%	**
Z-3988 B445	3	8	15	12800 ± 120	13538–13176 cal BC, 68.3%	***
Z-3989 B446	4	8	16	12660 ± 90	13296–13001 cal BC, 68.3%	***
Z-3990 B444	5	8	21	12720 ± 70	13325–13109 cal BC, 68.3%	***
Z-3991 B442	6	8	24	13300 ± 110	14220–13876 cal BC, 68.3%	***
Z-3992 B448	7	8	32	14080 ± 100	15349–15084 cal BC, 68.3%	***
Z-3993 B449	8	8	34	14480 ± 100	15882–15512 cal BC, 68.3%	**
Z-3994 B455	9	B5/C5	100	7410 ± 70	6386–6226 cal BC, 68.3%	*
Z-3995 B447	10	D5/D6	105	8200 ± 70	7321–7077 cal BC, 68.3%	*

Other measurements:
*VERA 2340, 2341, 2344 (7300 to 8230 BP); Z-1742 (5430 ± 100 BP) (Srdoč et al. 1989), Z-1967 (7300 ± 120 BP) and Z-1968 (6990 ± 120 BP) (Srdoč et al. 1992).
**VERA 2338 (16160 BP).
***VERA 2346 (12260 BP).

Z-3514 Statue of Christ, No. 8504 **1450 ± 40 BP**
B79

Wooden sample taken from the back of the Renaissance statue of Christ from the Cathedral (cal AD 593–646, 68.3%).

Comment: (MD) Expected 16th century.

Z-3515 Wooden cross, No. 8505 **695 ± 35 BP**
B78

Wooden sample taken from the Renaissance cross from the cathedral (cal AD 1278–1302, 53.9%; 1369–1378, 14.3%).

Comment: (MD) Expected 16th century.

Sorkočević Palace, Dubrovnik

Dating of two *tabulata*, paintings on a wooden panel, from palace of family Sorkočević, today Bishop′s Palace in Dubrovnik (Figure 1, city 27), S Dalmatia (42°38′36″N, 18°6′19″E). Samples submitted 2005 by D. Krstić, Croatian Restoration Institute, Zagreb.

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Z-3597 Big tabulatum **215 ± 50 BP**
B187

Wooden piece taken from a part of Big tabulatum, Label 8828 (cal AD 1644–1685, 22.2%; 1734–1804, 37.2%; 1929–. . . , 8.9%).

Comment: (DK) Expected Rennaisance period, ca. 1550 AD.

Z-3598 Small tabulatum **370 ± 50 BP**
B188

Wooden piece taken from the flat part of Small tabulatum, Label 8831 (cal AD 1456–1522, 39.8%; 1575–1625, 28.4%).

Comment: (DK) Expected Renaissance period, ca. 1550 AD.

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