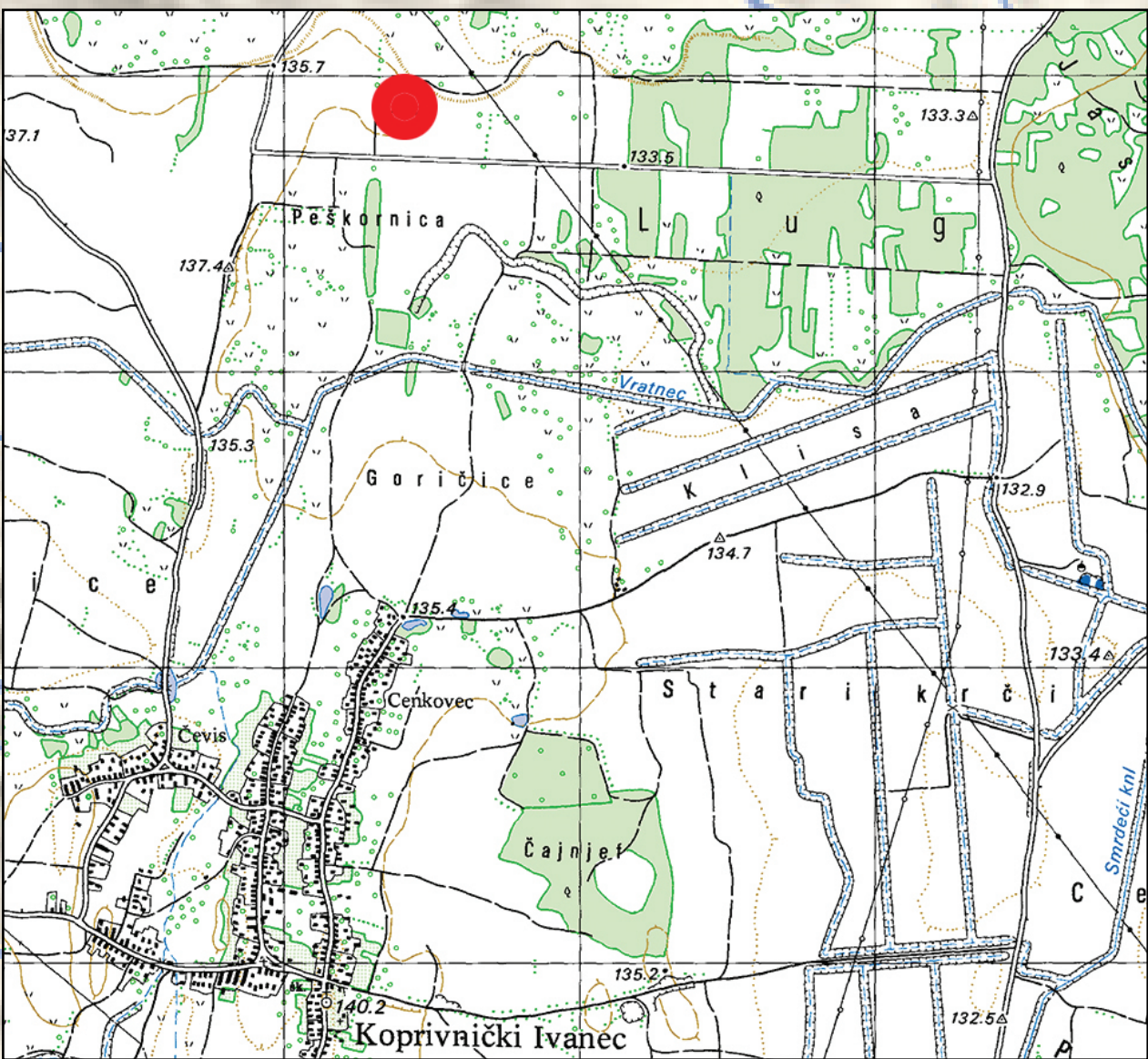


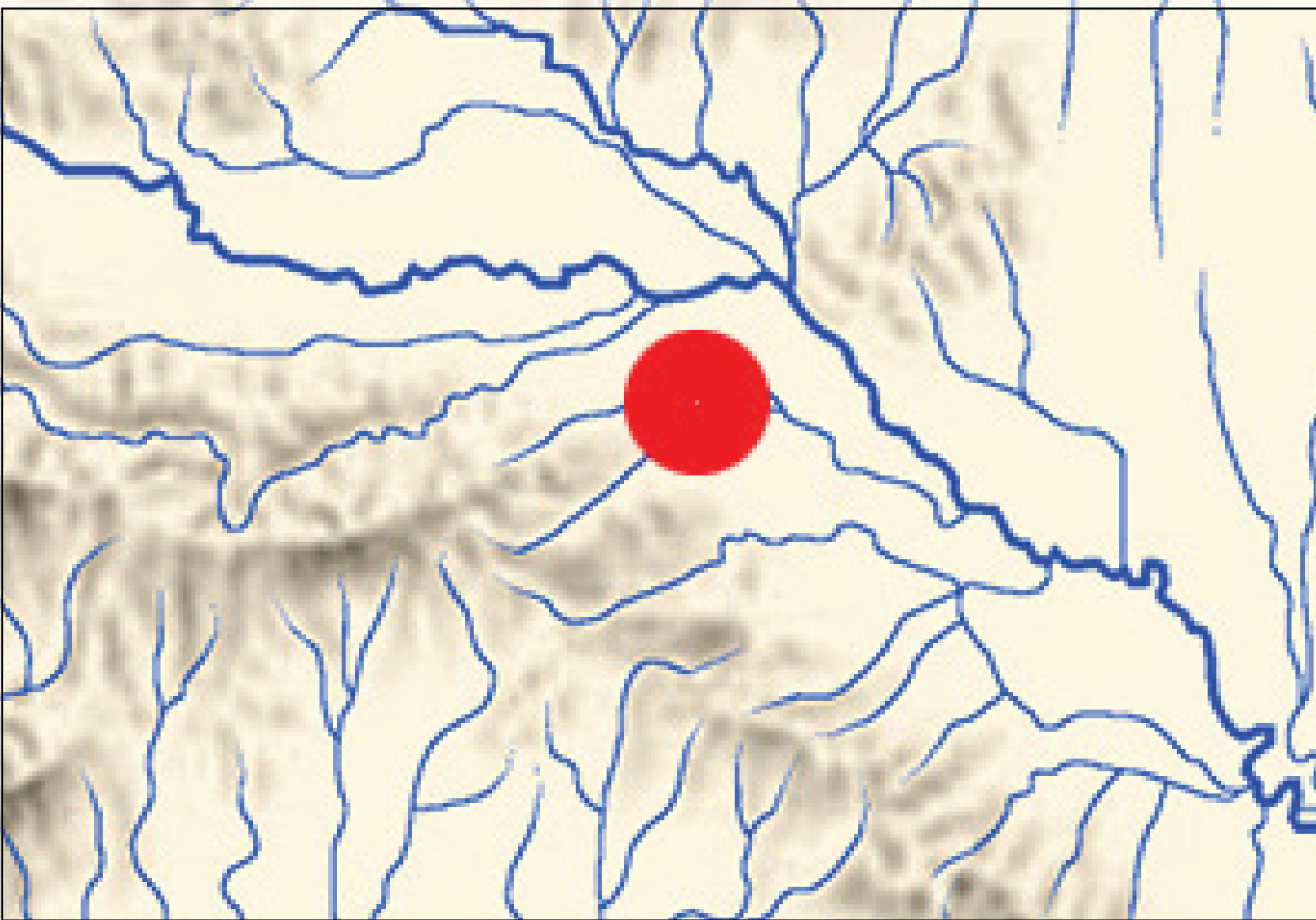
# Traces of iron smelting on the Koprivnički Ivanec - Log / Parag I site



Map 1. Log / Parag archaeological complex (source: geoportal.dgu.hr; modified by: I. Valent)



Map 2. Position of the Log / Parag I archaeological site (source: Topographic map 1:25 000, Koprivnica 272-4-1, modified by: I. Valent)



The Koprivnički Ivanec – Log / Parag I (KI-LP I) site is a part of a larger archaeological zone Log - Parag which consists of five positions situated south of the old river bed of the Gliboki stream, situated three kilometres north of the village Koprivnički Ivanec, in the Koprivnica-Križevci county (Map 1, 2). The archaeological finds collected during extensive field surveys of the Log - Parag complex point to long term occupation of the territory, from middle Bronze age to Late Medieval Period (Valent 2017: 127-132). Systematic excavations carried out in the site during 2018 and 2019 (1655 m<sup>2</sup>) confirmed the results of the previously conducted field survey about the time period in which the Log - Parag I position was occupied – Antiquity and Early Middle Ages. Even though traces of smelting furnaces nor any other archaeological structures which might point to the existence of a smelting workshop on the site were found within the excavated part of the settlement, different types of finds, associated with the smelting process suggest that such activities took place in the vicinity of the excavated part of the site. During the two-year campaign pieces of different types of smelting slag - tap slag (Fig. 1), liquid slag from the interior of the furnace (Fig. 2), slag from the bottom of a furnace (?) (Fig. 3), slag from the primary process of the consolidation of the *bloom* (?) (Fig. 4), unidentified slag from the process of iron production (Fig. 5) - and pieces of vitrified furnace walls (Fig. 6) were found within ten archaeological features (Tab. 1). All the structures were interpreted as pits or semi-dug objects and are dated to the Early Medieval period. No pieces of slag or furnace walls were found within the structures attributed to Antiquity period, dated between the early 1<sup>st</sup> and beginning of the 3<sup>rd</sup> century.

The preliminary results of the analysis of the ceramic finds collected within the Early Medieval objects were compared with the ceramic material found on the nearby archaeological site Torčec - Prečno pole I. The comparison of the material revealed that the types, decorations, fabric and production of the Log - Parag I ceramic is contemporary to the Torčec II phase (Sekelj Ivančan 2010: 114-124).

Giving the fact that the ceramic material found in the same context with metallurgical finds points to their concurrent deposition within the features, smelting activities which took place on the site, or in its vicinity, might be dated within the 8<sup>th</sup> century. On the other hand, giving the fact that the presented pieces of slag might have been secondary deposited within the Early Medieval objects, one must not rule out the possibility that the iron production that took place on the site occurred in the period between the two mentioned time frames.

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Tab. 1. Koprivnički Ivanec - Log / Parag I; representation of different types of metallurgical finds

No.	Site	US	Sample No. (U)	No. of pieces	Weight (g)	Interpretation
1	KI-LPI2018.	1/2	77	1	29	Tap slag
2	KI-LPI2019.	1/2	80, 117	5	186	Tap slag
3	KI-LPI2019.	25	99	1	49	Unidentified slag
4	KI-LPI2018.	27	75	4	250	Unidentified slag
5	KI-LPI2018.	27	76	1	35	Tap slag
6	KI-LPI2018.	199	72	1	44	Unidentified slag
7	KI-LPI2018.	199	73	1	166	Slag from a proces of consolidation of the bloom (?)
8	KI-LPI2018.	287	7,78	1	8	Slag from the bottom of a furnace
9	KI-LPI2018.	297	3	3	604	Tap slag
10	KI-LPI2018.	297	74	2	16	Unidentified slag
11	KI-LPI2018.	359	25	5	284	Tap slag
12	KI-LPI2018.	361	26	3	72	Tap slag
13	KI-LPI2019.	471	118	1	3	Extremely vitrified furnace wall
14	KI-LPI2019.	499	110,111	36	2002	Tap slag
15	KI-LPI2019.	499	110	1	28	Vitrified furnace wall
16	KI-LPI2019.	499	110	1	34	Liquid slag from the interior of a furnace
17	KI-LPI2019.	499	111	4	463	Bottom of a furnace (?)
18	KI-LPI2019.	577	114	54	1539	Tap slag
19	KI-LPI2019.	577	114	17	219	Slag from the bottom of a furnace (?)

