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Bloomery works – organisation of an early medieval iron production

process

ZZ TransFER

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- Hlebine Velike Hlebine isolated ridge, away from the settlement
- Hlebine Dedanovice outer perimeter of the settlement

Hlebine – Velike Hlebine site



Results of magnetometry (Geometrics G-858), background : aerial photography (DOF).

- Areas of extra high magnetic anomalies are concentrated on the place where a high concentration of surface slag was found.
- Cluster of low magnetic anomalies can be interpreted as pits without iron production debris. (Mušič, B., Medarič, I., Matijević, F., 2016 2017.)



Ground plan, Hlebine - Velike Hlebine site, excavation 2016 – 2017



Remains of the smelting furnaces (SJ 038/38-1 and SJ 037/ 37 -1)





S 2







ore

Smelting waste – tuyere, slag, furnace walls

Raw and

roasted

Distribution area – operating space –

- Ore roasting
- Waste discarding (382 kg)



Hlebine Dedanovice site



Hlebine – Dedanovice site excavation, furnaces 2018. (photo: T. Sekelj Ivančan)





Arh. Sample	Site	Period	Туре	Quartz	Goethit	Hematit	Magnetit	Rutile	Other min.
SJ 83 (N 242)	Hlebine - Velike Hlebine		Iron ore	++	+++	-	+	-	PI
SJ 27 (U 71)	Hlebine - Dedanovice		Roasted iron ore	+	-	+++	-	-	/
SJ 10 (U 26)	Hlebine - Dedanovice	7th century	Roasted iron ore	+	-	+++	-	-	Mgh
SJ 16 (U 45)	Hlebine - Dedanovice		Roasted iron ore	+	-	+++	-	-	/
SJ 8 (U 11)	Hlebine - Dedanovice		Roasted iron ore	+	-	+++	+	-	/
SJ 102/90 (N 223)	Hlebine - Velike Hlebine		Roasted iron ore?	+	++		+++	-	/

Mineralogical composition of the ore (XRD), Tomislav Brenko, Faculty of geology and mining, Zagreb,



REE correlation – roasted ore: Hlebine Velike Hlebine – Hlebine Dedanovice = very similar general trend, minor differences in elements

same micro - enviromental conditions of formation? – same exploatation ground

- Contemporary sites interrelated metalurgical activities
- Smelting and bloom consolidation/refining workshop situated 700 m from contemporary settlement,
- distribution of finds shows spatial organisation in relation to steps of the process
- Bloom refining/consolidation and/or primary smithing? within settlement grounds and workshop
- REE corellation single exploatation ground Hlebine Velike Hlebine and Dedanovice - organisation of ore collecting, preparation, storage ?

Further considerations:

- Mineralogical and geochemical analysis correlation of ore, slag from both sites
- Comparison with contemporary sites





