metallum, i, n:
Mine (often pl.)
Metal, also stone, mineral

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Mine, shaft, gallery;
esp. a) Mine (usually pl.)
b) Quarry
The "Deer Stone" monument in central Mongolia. By around 1200 BC, this type of carved standing stone became a ubiquitous feature of burial ritual in the Late Bronze Age of northwest Mongolia. It depicts a belted warrior equipped with a typical assemblage of steppe artefacts (dagger, knife, mirror and bow) and stylised flying deer on his torso. This, together with horse remains found in the burial monument, signifies the rise of a highly mobile pastoral culture in eastern Eurasia. Photo: Y.K. Hsu.
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Extended Abstracts

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At present, two separate phases of prehistoric smelting activity are recognised in the Italian Trentino - Alto Adige/Südtirol Region: the first in the later Copper Age and Early Bronze Age (Pearce, 2007, pp. 74-76), the second in the Middle, Recent and Final Bronze Age and Early Iron Age (Pearce, et al., 2020). They have very different characteristics. In the second phase of smelting, there are groups of stone-built open-air furnaces, sometimes in pairs with a roasting bed, and large heaps of slag (Cierny, 2008); production is on a large scale and would seem to have been highly visible in the landscape. Smelting mostly takes place in the areas where copper ore outcrops were mined (Preuschen, 1973). However, smelting in the first phase, the later Copper Age and Early Bronze Age, is entirely different and seems to have had a ritual connotation. This can particularly be seen in the area close to the present-day city of Trento, where Copper Age and Early Bronze Age slag has been found at various rock shelters: Acquaviva (Besenello - TN), and Riparo Gaban, Romagnano Loch, La Vela di Valbusa and Riparo Marchi (Trento - TN). These are situated some distance from copper ore sources, at least 10 km as the crow flies (D’Amico, et al., 1998, p. 37); moreover, because of the mountainous Alpine terrain the actual distance travelled between the mine and the smelting place would have been greater and journey times long.

At Acquaviva, layers with a small furnace and slag heap overlie a female secondary burial (Angelini, et al., 1980, fig. 2) whose radiocarbon date of 3340-2900 cal BC (bone sample, ETH-12497: 4410±70 BP; Pedrotti, 2001, pp. 202-203, 211-212, note 86 on p. 244) gives a terminus post quem for the metallurgical activity, though it is not clear how long a time elapsed between the burial and the smelting. Another furnace and an associated tuyère were also found at the site.

At Riparo Gaban, slag, tuyères, a crucible and a furnace were found (D’Amico, et al., 1998, p. 31, table 1) and a radiocarbon date of 2630-2300 cal BC (layer C5, Bln-1776: 3985±50 BP; Pedrotti, 2001, note 142 on p. 249) gives a terminus ante quem for the earliest smelting in layer C6.

At Romagnano Loch, the earliest evidence for metalworking, a crucible found in layer Q, sector III, is bracketed by radiocarbon dates (Alessio, et al., 1978, p. 80) - the layer below dates to 3710-3380 cal BC (layer R, R-775: 4810±50 BP) while the layer above dates to 2290-1960 cal BC (layer P, R-769: 3720±50 BP). There is also evidence for early Bronze Age metalworking. Smelting evidence includes slag, two tuyères and a
furnace. Burials are found in layer P of sector III (Perini, 1971, pp. 92-95; 1989; 1992, p. 53) and fragments of a crucible with traces of metal were found in the stone setting of tomb 12, which contained an adult whose bones were damaged by fire, probably as a result of later metalworking (Perini, 1975, pp. 300-301; Nicolis, 2001, p. 340). In sector IV, adjacent to sector III, slag associated with early Bronze Age pottery was found underlying a burial (Perini, 1971, p. 100).

At the Vela di Valbusa, a spread of slag, plus an area of baked clay and a furnace associated with a tuyère, was over lain by an Early Bronze Age tumulus and inhumation burial; a further two tuyères were also found at the rock shelter (Fasani, 1990).

At the Riparo Marchi, smelting can be dated to the end of the Copper and beginning of the Early Bronze Age (Mottes, et al., 2014); slag can be found in layers dating to the Early, Middle and final Middle-Recent Bronze Age of the nearby tumulus I at Gardolo di Mezzo (Mottes, et al., 2011; 2017).

Smelting slag has also been found at the Riparo di Monte Terlago rock shelter (Terlago TN), west of the Adige (Etsch) valley on the slopes of the Paganella massif, in layers dating to the Early and Middle Bronze Age (Dalmeri, et al., 2011).

It should be noted that smelting is also documented at open air sites (pace Dolfini, 2014, p. 497), for example a furnace and tuyères were found in a context with late Copper Age pottery at Tof de la Val, close to the Romagnano Loch rock shelter (Perini, 1973). Open air smelting sites are also known in the upper Adige valley e.g. at Bressanone/Brixen-circonvallazione ovest (BZ) and Gudon/Gufidaun-propr. Plank (Chiusa/Klausen - BZ) (Tecchiati, 2013, pp. 473-474), and at two hilltop settlements in the Fersina valley, close to copper ore outcrops of the Valsugana and Valle dei Mòcheni mining districts east of the Adige: Montesei di Serso and Croz del Cius (Pergine Valsugana - TN). A late Copper Age furnace was found at Montesei (Perini, 1978, pp. 10-25; Pedrotti, 2001, pp. 210-211), and a contemporary furnace and slag were found at Croz del Cius (Perini, 1989, figs 16-17). Likewise, not all Copper Age and Early Bronze burials in the region are associated with evidence for metallurgy (Perini, 1975, pp. 206-307; Nicolis, 2001) though burials are linked to rock shelters in the Adige valley south of Bolzano/Bozen (Tecchiati, 2013, pp. 457, 474, fig. 24).

The picture – at least as regards the Trento section of the Adige valley – seems to indicate a pattern of smelting in rock shelters and a strong association with places used also for burial (Pedrotti, 2001, p. 211; Nicolis, 2001, p. 356; Pearce, 2007, pp. 74-76). It is well known from ethnography that smelting, which sees the transformation of a powdered ore into a red liquid metal, has magical aspects (e.g. Budd and Taylor, 1995) and we might therefore argue that later Copper Age and Early Bronze Age copper smelting in this area was a secret activity; certainly we can say that it seems to have taken place in a ritualised context, perhaps as secret knowledge that had to be kept hidden both from the miners who extracted the ore and also those who cast and worked the copper and bronze metal, and protected by ritual (Forbes, 1950, pp, 79-91). Herbert (1993) has drawn attention to the numinous quality of slag in sub-Saharan Africa, and perhaps it is no accident that slag seems to have been included in multiple layers of tumulus I at Gardolo di Mezzo, as noted above. In Bolzano/Bozen province, in the upper Adige valley, slag seems to have been ritually buried along with tuyère fragments at the third millennium BC site of Millan/Millandmetanodotto SNAM (BZ; ETH-26698: 4090±50 BP, 2880-2480 cal BC; Tecchiati, 2013, pp. 465-467, fig. 17) and deposited in the tumuli at Velturino/Feldthurns-Tanzgasse (BZ; Dal Ri, et al., 2004, pp. 158, 162). However, Early Bronze Age metalworking (as opposed to smelting) is documented by crucibles at the Trentino lake villages (palafitte) of Ledro (Battaglia, 1943, pp. 40, 53-54, tav. XXVI.2; Rageth, 1974, pp.
175-176, taf. 89, 90: 1-4) and Fiavè-Carera (Perini, 1987, p. 34, fig. 14.1) and so it was arguably carried out openly within settlements, at least in the Valli Giudicarie of south-eastern Trentino.

This pattern would seem to present a different picture to Copper Age smelting elsewhere in modern-day Italy. For example, at Lovere (BG) on the shores of Lake Iseo in the Lombardy Alps, smelting seems to take place inside a settlement (Giardino, 2006; Poggiani Keller, 2000) and the same pattern is seen in central Italy, for example at San Carlo-Cava Solvay (San Vincenzo - LI) (Artioli, et al., 2016).

There does, however, seem to be a relationship between metalworking, caves and burials in central Italy later in the Bronze Age (Nicolis, 2001, note 80 on p. 364; Pacciarelli and Sassatelli, 1997, p. 16); for example, at the Grotta dei Baffoni (Genga - AN), in the Sentino gorge, in the Early or Middle Bronze Age (Lucentini, 1997, pp. 37-39) and at the Grotta a Male near Assergi (L’Aquila - AQ) in the Middle Bronze Age (d’Ercole, 1997, pp. 54-61). We may also note that there are Middle Bronze Age burials at the Grotta della Monaca (Sant’Agata d’Ésaro - CS), in Calabria, where copper minerals were likely mined for pigments in the third millennium BC. After the burial phase there was a new phase of mining at the end of the Middle Bronze Age in the cave (Larocca, 2001; Larocca, ed., 2005). This association between metalworking and caves may have been very long-lived: in Graeco-Roman mythology, the smith of the gods, Hephaistos/Vulcanus, worked underground in places with volcanic activity, such as the Aeolian islands (d’Ercole, 1997a, p. 57 - see for example Apollonius, Argonautica, 3, 41-42).

We can therefore see that in the later Copper Age and Early Bronze Age Trentino - Alto Adige / Südtirol the world view of copper smelters was different to that in the second phase of prehistoric smelting. In this first phase, smelting often takes place in caves and rock shelters, which were often also used for burials, and slag was incorporated in ritual monuments. The picture is of a craft that was secret and ritualised, rather than a 'rational' semi-industrial craft.

References


Battaglia, R., 1943. La palafitta del Lago di Ledro nel Trentino. Memorie del Museo di Storia Naturale della Venezia Tridentina, 7, pp. 3-63


2 For the ritual significance of caves in prehistoric Italy more generally, see Whitehouse (1992) and Pacciarelli (ed., 1997).


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