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Touchstones of archaeology

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ABSTRACT

European archaeological collections record hundreds of thousands of stone artefacts from the Early Middle Ages described as whetstones. However, traces of non-ferrous metals, including precious metals preserved on a number of such artefacts. Many of the finds served in fact as touchstones – tools to test the quality of a particular metal. These artefacts are concentrated mainly in Vendel and Viking Age and Slavic coastal settlements and trade centres in the Baltic Sea basin, the coast and islands of Northwestern Europe, at Central and Eastern European fortresses and suburbia. Many finds also come from rural settings. In early medieval graves the touchstones join balance scales and weights as a sign of the buried individual's access to precious metals. Especially the rural finds with traces of precious metal provide a strong reason for a revision of present views on the social stratification of the early medieval society in Europe. Chemical microanalysis allows identifying the composition of the alloys. Besides new perspectives on the fields of the social history and the circulation of precious metals, the method also provides new information for the field of archaeometallurgy.

> *It remains to speak of the touchstone with which gold and silver are tested, and which was also used by the Ancients. For although the assay made by fire is more certain, still, since we often have no furnace, nor muffle, nor crucibles, or some delay must be occasioned in using them, we can always rub gold or silver on the touchstone, which we can have in readiness* [...]. *First the gold is rubbed on the touchstone, whether it contains silver or whether it is obtained from the mines or from the smelting; silver also is rubbed in the same way. Then one of the needles, that we judge by its colour to be of similar composition, is rubbed on the touchstone; if this proves too pale, another needle which has a stronger colour is rubbed on the touchstone ...*
>
> Georgius Agricola, 1556
> (Hoover and Hoover, 1950, 252–253)

Introduction

European chronicles are full of tales recounting the great violence unleashed in the Middle Ages by the passion for wealth. On the other hand, written sources reveal little of the quiet journeys taken at the time by objects made of precious metals to satisfy a much broader range of typically more benevolent human needs. And regardless of whether the objects were luxury products, pieces intended for subsequent working or merely raw materials, each of them had to be authenticated (for an illustrative example, see Ingvardson, 2012, 300–302). The simplest means for doing so was a quick and reliable tool – a touchstone. The advantage of this essentially non-destructive method was the speed of tests without the need of laboratory equipment; however, testing required considerable experience (see e.g. Zedelius, 1981; Oddy, 1983). The Renaissance scholar and metallurgist Georgius Agricola described how to use a touchstone for testing the quality of precious metals (see the epigraph; see also Ercker, 1574, 54–57). For us, however, "it remains to speak" about many tests concerning the ages of "the Ancients".

In the Antiquity as well as in the Post-Medieval period, comparison of colour of streak of a metal object on smooth wall of a touchstone with colour of streak of reference needle from a needle set allowed to determine the purity of precious metal with the accuracy of at least 2% (Oddy, 1983, 55–56; for an 16th-century example, see Georgius Agricola, or Hoover and Hoover, 1950, 255). However, no set of reference needles nor standard alloys in other form have been documented among finds from early medieval Europe, including numerous burials furnished with touchstones. Early medieval experienced user could probably ascertain the quality of the tested metal simply by studying the colour of its streak on the touchstone. As such, countless traces of alloys and metals were left on touchstones; it was necessary, after all, to test a wide range of lustrous materials encountered by metallurgists, goldsmiths, jewellers, deposit prospectors, and all others who

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came into contact with non-ferrous metal: Exchange, regardless of its specific form and social circumstances, also belonged among these activities – and not only in the Early Middle Ages.

Touchstones traditionally had a carefully worked oblong shape with a right-angled cross-section, flat and smooth walls and were made of a hard raw material (most often metamorphic rocks like schist, slate, or phyllite, and quartzite, or various types of fine-grained and solid metasediments or homfels). Nevertheless, none of these qualities are *condicio sine qua non.* We know three-, five- or six-sided touchstones, spherical touchstones, touchstones made of fine-grained sandstone, etc. However, due to the careful selection of raw material (often imported over great distances), from which the vast majority of touchstones were produced, there is no support for speculation on their multi-purpose nature or the use of common whetstones for the occasional testing of metals. Evidence against an interpretation of this type is the exacting, often elegant design and size of the artefacts (frequently longer than 30 cm) or, conversely, their small size (often shorter than 5 cm). And, finally, any such considerations are also ruled out by the results of conducted analyses (see below), which in only rare cases identified traces of iron among the thousands of identified streaks of metals: the origin of iron traces can also be ascribed to archaeological tools, especially in the frequent recording of a chromium admixture.

We know early medieval touchstones of dark as well as red, light grey, greenish-grey, yellowish-grey, ochreous colours (cf. Oddy, 1983, 58); touchstones from banded schist of several colours have been found in Northern Europe. A ring for hanging was sometimes preserved in the hole on the end of the artefact. One such ring from Birka was made of silver with an admixture of copper (94: 6 wt.%; gr. No. 573) as well as another one from Vendel (96: 4 wt.%; gr. No. IX). The drilled end of a specimen from Hedeby is equipped with a gold-plated forging (Resi, 1990, 35, Pl. 10: 1). Even those artefacts are labelled as "whetstones" in publications, sometimes as an amulet or jewellery. The overall number of touchstones found in early medieval sites in Europe cannot be determined; the majority of these, assumed to be whetstones, remain unnoticed and unpublished. This involves dozens of thousands of artefacts, at the very least; only a few selected examples can be given in this text. However, archaeological collections hold only a small fraction of these tools that have been used in Europe for centuries.

The method and its problems

Chemical microanalysis combined with surface observations of the stone artefacts using an electron microscope (EDS–BSE) made it possible to identify a number of tools for determining the value of metal among objects labelled as whetstones (Ježek and Zavřel, 2010, 2011, 2013). Chemical microanalysis of lines or grains of precious and non-ferrous metal on the surface of touchstones (see Fig. 6) furnished data on the content of individual oxides, or chemical elements in the investigated alloys. The findings are given in the tables below in per cent (%) and calculated at 100%; these data are semiquantitative. We are not the first to use this method: 20 years ago Frank Wietrzichowski (1993, 38) identified in SEM traces of gold with a small amount of silver and copper on a touchstone from the 8th or the first half of the 9th century Baltic coast settlement of Groß Strömkendorf (Mecklenburg-Vorpommern, Germany).[1]

The main complication in making a positive identification of touchstones among archaeological finds relates to their actual use in the distant past: Before a touchstone could be used, it was necessary to remove the remnants of the previous test. Centuries ago, touchstones were cleaned with salty water, wax, they were also sanded. As a result, traces of tests with non-ferrous metal are typically found on touchstones that were either lost, discarded as the result of being damaged or placed among the grave goods of their deceased owner. Although betting on an *argumentum ex silentio* in archaeology seldom pays off, in the case of stone artefacts with a shape common for whetstones (?) and touchstones, this line of reasoning can be quite valuable. Sharpening clearly leaves far heavier traces than tests of the quality of a potentially valuable object. Therefore, if a chemical microanalysis on a stone artefact with the characteristic form and raw material does not reveal streaks of iron, the object is not a whetstone. Of course, it is difficult to reconstruct the methods of cleaning archaeological finds from the 19–20th centuries today.

However, the classification of artefacts of the characteristic form taken from graves, settlements and metallurgy worksites from throughout the whole of Europe is not a topical subject, despite being one whose study is literally endless. Besides new perspectives on the fields of trade, the circulation of precious metals, the role of touchstones in society and in representation, the social stratification of early medieval society and the significance of graves goods, the method also provides new information for the field of archaeometallurgy and an opportunity for petrographic questions related to the distribution of stone raw materials. While these questions link divergent cultural, ethnic and religious areas of early medieval Europe, the possibility of answering them in today's far more differentiated Europe depends on various local behavioural patterns.

The selection of the examples presented in this text falls far short of the author's wishes. However, while the presented finds come from sites of world renown and those that are less prominent, these distinctions have hardly any bearing on their testimonial value. A decisive factor in the selection of the samples was the willingness of museums to lend the artefacts for analyses, the availability of a SEM with the required parameters and, last but not least, the author's own logistical possibilities. Although the only option is to proceed with a presentation of the available samples, this paper is based on chemical microanalyses of around a hundred of stone artefacts on which thousands of streaks of non-ferrous metals were preserved; the analysed finds come from Poland, Sweden, Germany, Slovakia, Austria and the Czech Republic (Fig. 1). The sample is but a fraction of published finds and a negligible share of the finds held in archaeological collections. Nevertheless, even a sample of this kind permits certain conclusions to be reached. Touchstones will first be introduced as items of prestige intended for both use and display; this is followed by a discussion of how touchstones were used to signal access to precious metal.

Tools of the demonstration of power

Touchstones are very common in high prestige burials. Many touchstones have been elaborately worked into elegant forms. The dimensions of certain specimens were superfluous for the purpose of testing the quality of metal. "Princely" grave No. 74 in "Slavic" Starigard (today Oldenburg in Schleswig-Holstein, Germany) contained a perfectly worked stone artefact 18.5 cm in length; grave No. 68 at the same site produced a thin stone artefact 19 cm in length (Gabriel and Kempke, 2011, Pl. 117: 6, 116: 5). The Frankish aristocratic burial at Morken (near Cologne, Germany) contained a "whetstone" 28 cm in length (Böhner, 1959, 25). Characteristic stone artefacts with lengths of 26–28 cm come from several Viking Age graves in Birka (Nos. 644, 842, 1143 and others). Stone objects from richly furnished Viking Age burials in the territory of Denmark often reach lengths 20–30 cm (Baarup,

[1] I thank Frank Wietrzichowski (not only) for kindly providing the analysis report.