

Agricola's *De re metallica*, 1556. Part 2

In Part 1 I mentioned the Hoover translation of *De re metallica*. Since this is the only English translation, it is likely to be the lens through which most modern readers will view Agricola's work and so merits some further discussion.

It is a good translation in that it presents the meaning of Agricola's text clearly and accurately and the extensive accompanying notes by Herbert Hoover are illuminating. But, for those who are not mining engineers or metallurgists, the replacement of Agricola's rather general descriptions by modern technical words often adds little light – and sometimes has the opposite effect; for example, Hoover's 'upper cross launder' is less helpful to a general reader than Agricola's 'upper transverse channel' and, in any case, the woodcuts make his meaning crystal clear. The Introduction and Appendices, and particularly the voluminous notes, show the application of very considerable industry and not a little scholarship as well as much technical expertise. But the Introduction detracts somewhat from the book's appeal. It makes a good deal of the difficulties the translators encountered and, in this process, presents some nonsense which is delivered in a tone sometimes condescending, irritable and rather pompous.

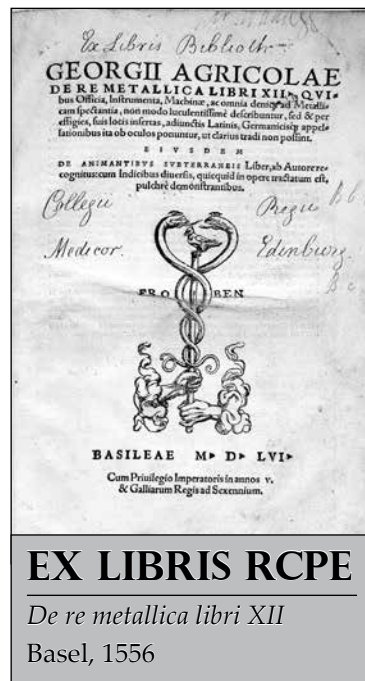
THE HOOVERS ON AGRICOLA'S LANGUAGE

As we agreed with the Hoovers in Part 1, and as Agricola himself said, appropriate Latin technical vocabulary was not available to him; here is the translators' explanation for this:

.... in using Latin, the author availed himself of a medium which had ceased to expand a thousand years before his subject had in many particulars come into being; in consequence he was in difficulties with a large number of ideas for which there were no corresponding words in the vocabulary at his command (my italics, Preface, i²)

This is nonsense. Far from ceasing to expand in about 500 AD, Latin vocabulary expanded continuously for considerably more than another millennium. Agricola's lack of technical vocabulary was not because of lack of expansion of Latin but because authors who did not write about mining or metallurgy had no need of such vocabulary and so did not devise it.

Though the translators do touch on this, they apparently did not see it as crucial. In response to the problem of



vocabulary, which Agricola himself discusses in his introduction, he did what all renaissance authors did, he used general vocabulary to give descriptions of particular things or processes. But he went much further; he added several hundred excellent woodcuts, placed in the text beside the verbal account, which make his descriptions of physical arrangements very clear indeed. And in his dedicatory preface, after summarising his book, he explains exactly why he has done this:

So I have taken up this task, and if I have not completed it because it is so extensive, I have certainly endeavoured to do so; for I have expended much work and labour upon it and also laid out some expense. Indeed, I have not only described the veins, seams, machines and, furnaces but also paid artists to portray them in pictures lest matters

set out in words might be unclear either to those of our own time or might in future cause difficulty: just as many words are unclear to us which the ancients – to all of whom they were familiar – handed down without explanation. (Sig. a3 v.³ my translation).

But our translators say no more about the woodcuts than that it is uncertain who made the drawings for them. There is nothing of their excellent quality, nothing of the care with which they are inserted in the text nor of how well they are printed, or how they illuminate the text's meaning. And nothing of how unusual this close integration of text and illustration was – and how successful it is for the reader. If Agricola's book was not revolutionary in this respect it is only because Vesalius had set the model for it only a few years before with his *Fabrica* of 1543. Though Agricola's woodcuts do not reach the pinnacle of achievement of drawing of those of the *Fabrica*, they are fine pieces of work.

The translators praise Agricola's writing as clearer than that of his contemporaries, but are nevertheless remarkably condescending about it:

Agricola's Latin, while mostly free from mediæval corruption, is somewhat tainted with German construction. Moreover some portions have not the continuous flow of sustained thought which others display, but the fact that the writing of the work extended over a period of twenty years, sufficiently explains the considerable variation in style. The technical descriptions in the later books often take the form of House-that-Jack-built sentences which have had to be at least partially broken up and the

subject occasionally re-introduced. Ambiguities were also sometimes found which it was necessary to carry on into the translation.

Agricola wrote in the mid-16th century; to speak of his Latin as free of 'mediæval corruption' is akin to marvelling that we do not find Chaucer's cadences in Dickens nor the rhyme scheme of the Gawain Poet in Wordsworth. Nor was mediæval or renaissance Latin, in general, corrupt. Of course, some was better than others. And of course there were changes in style, syntax, and in the range of meanings of words over a thousand years. To call changes in a developing language corruption – and Latin was a developing language for much more than one-and-a-half millennia – is extraordinary. Two conclusions seem possible – that post-classical writers in Latin were semi-literate – or that those making the claim were simply ignorant. Before deciding between these it would be well for a modern reader to remember that post-classical scholarly authors were brought up with Latin as their literary language, that they had a familiarity with it from childhood that few, if any, modern scholars can match and that it was their natural daily medium of written expression. Classical writers were, indeed, a model for them – but a model and not a rigid mould. As for what the Hoovers call, condescendingly, 'House-that-Jack-built' sentences in *De re metallica*, I confess I have not bothered to look for them. That the writing of the book took place over 20 years is an assumption by the translators for which there is no evidence; we do not know how long Agricola spent writing it. His ideas no doubt developed over 20 or more years but that is quite different. What the Hoovers describe is probably just an example of the style upon which John Forrester remarks succinctly in discussing his translation of the *Physiologia* of the mid-16th century physician Jean Fernel:

Fernel is well able to use the inflected language of Latin in long yet lucid periods, which English cannot handle, so that syntax has to undergo substantial recasting. (Introduction, p.9⁴)

These passages are very familiar to anyone who works on such texts – and they are sometimes found in renaissance vernaculars as well as in Latin; the occasional ambiguity is also unremarkable.

Interestingly, in his 1916 review⁵ of the Hoover translation, Fairclough, a classicist at Stanford whom the Hoovers had consulted, says simply 'The Latinity of Agricola is comparatively smooth and pure...', though he does repeat the 'House-that-Jack-built' comment he takes it, apparently, as referring to the technicality of the language rather than to Agricola's syntax.

How did translators apparently so ignorant of the context of their source-text manage to produce such a useful translation? Their remarks about Agricola's Latin probably reflect a fashion of the times, the tendency of some classically-educated writers with their own ideals of classical style to be contemptuous of later Latin authors

– writing on different topics in another age, often for quite different purposes and for a different audience – as falling short of them. The translators' opinions on Agricola's Latin matter now only because they make one curious about why a good translation should be preceded by a preface so disagreeably pompous, condescending and containing manifestly silly comments on the original author's text. Even more extraordinary is the faintness, almost to vanishing point, of their praise for Agricola's skill, his artists' and that of his printer, in combining illustration and text to illuminate his material; an achievement which the translators would seem simply not to have noticed.

THE WOODCUTS

The illustrations in *De re metallica* are its most immediately striking feature; profuse in quantity and high in quality they integrate with the text to illuminate its meaning. Agricola says nothing of their makers but a contemporary pastor, who was fond of including remarks on their trade in his sermons to his mining audience, attributes the drawings for the woodcuts to one Blasius Weffring of Joachimsthal.⁶ Some of the blocks were cut by Hans Rudolf Manuel Deutsch (fl.1525–1572) who signed seven of them with his monogram (Figure 1). Deutsch also illustrated books by Oporinus but his best-known work is probably his maps for the *Cosmographia* of Sebastian Münster first published in 1544. His woodcuts have been compared, not unfavourably, with those of Hans Holbein the Younger. One block in *De re metallica* is signed by Zacharias Specklin; the cutters of the unsigned blocks – the great majority – are unknown. Woodcuts can be combined with letterpress because, like it, their printed surface is in relief and so both can be printed together on the common press. To produce a good impression simultaneously from letterpress and block, the latter must be carefully levelled on the press and it is often necessary to add padding to the frisket to adjust the pressure; the inking must also be careful. All of this quite exacting work was well within the compass of an excellent printing house like Froben's and, here, the execution is excellent as we see from the clear, clean, even impressions.



FIGURE 1 An example of the monogram of the blockcutter Hans Rudolf Manuel Deutsch (width of the monogram is 13.23 mm)



FIGURE 2 A woodcut showing a workman protecting his eyes from the radiant heat of an assay furnace by viewing the white-hot crucible through a narrow slit in a wooden board

There is not space here to describe in any detail the very large and varied content of the book. In summary, it deals with the techniques of mining and the management of mines, of numerous metallurgical processes from preparing the ores for smelting to assaying the metal content and, in many cases, refining it. As the Hoovers pointed out, the book gives the most detailed account that exists of contemporary mining and metallurgical technology in renaissance Europe.

INDUSTRIAL DISEASES

De re metallica contains the first real description of the industrial diseases of miners. Agricola was very aware of the dangers of mining. The following translations are from the Hoover edition.

It remains for me to speak of the ailments and accidents of miners, and of the methods by which they can guard against these, for we should always devote more care to maintaining our health, that we may freely perform our bodily functions, than to making profits. Of the illnesses, some affect the joints, others attack the lungs, some the eyes, and finally some are fatal to men.

He was very clear about the necessity for adequate ventilation and devotes many pages and illustrations to the 'ventilating machines' needed:

Stagnant air, both that which remains in a shaft and that which remains in a tunnel, produces a difficulty in breathing; the remedies for this evil are the ventilating machines which I have explained above.

Then Agricola comments on lung disease produced by dust:

for the dust which is stirred and beaten up by digging penetrates into the windpipe and lungs, and produces difficulty in breathing, and the disease which the Greeks call *ἄσθμα*.

'Asthma' in the 16th century was a more generally inclusive diagnosis for diseases producing breathlessness

than it is now. Also, some types of dust are corrosive, he says, and this type of dust:

eats away the lungs and implants consumption in the body... women are found who have married seven husbands, all of whom this terrible consumption has carried off to a premature death.

This probably refers to the effects of toxic metallic dusts rather than to silicosis or pneumoconiosis, which would perhaps be unlikely to kill quickly enough to destroy seven successive men in a woman's married lifetime. Agricola also warns that protective boots and gloves must be worn in mines where toxic arsenical or cobalt ores were mined.

The processes of smelting, refining and assaying ores were also hazardous and the workers were aware of these risks. Figure 2 illustrates an assayer protecting his eyes from radiant heat by looking at the crucible in the furnace through a narrow slit in a wooden board. The text does not suggest that Agricola devised any particular improvements in industrial safety but it leaves no doubt that he was well-informed about the risks.

There is not space for more examples; those interested in the technology of 16th century mining and metallurgy will not find it difficult to find a copy of the Hoover translation of *De re metallica* which, particularly if one does not pay too much attention to the preface, is a very adequate translation of a truly seminal book and, in which, the notes by the mining engineer Herbert Hoover considerably aid the understanding.

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Fons A. Pellis B. Argonautæ C.



The Argonauts with the Golden Fleece.

Woodcut from the eighth book of Agricola's *De re Metallica*, Basel, 1556. See pages 248–50.
Legend: A Water source; B the Fleece; C Argonauts.

Agricola used the legend of the Golden Fleece to illustrate one contemporary method of collecting relatively pure metals. Just as, according to the myth told by the poets, in Colchis the inhabitants used a fleece placed in a stream to collect gold so, Agricola says, in fact such fleeces are used by miners to collect not only gold but also silver and gems.

At the bottom left of this charming image two rather sleepy-looking Argonauts – or perhaps they are just exhausted by the voyage – and one cheerful fellow indicate not a fleece but a ram (which looks alive) in a pool beneath a little waterfall. The details seem to have gone a little awry since the ram's head is apparently detached and supported by a stone wall at the edge of the pool and the fleece is not visible behind the head where the Argonaut is pointing. Interestingly, Agricola says that the Colchians put skins in the water, but that the poets constructed from this the legend of the Golden Ram (not the Golden Fleece).