

# Wurmbunte Klingen. Studien zu Konstruktion, Herstellung und Wertigkeit der frühmittelalterlichen Spatha in Westfalen

## (Curlycued blades. Studying Structure, Construction and Significance of Early Middle-Age Swords from Westphalia)

### Science

This is a 500+ page PhD thesis of Ulrich **Lehmann** - written in German. The author looks in detail at 28 swords (spatha) unearthed in Westphalia (Germany) from around 600 - 800 AD. The hilts and scabbards (as far as still present) are also covered in large detail.

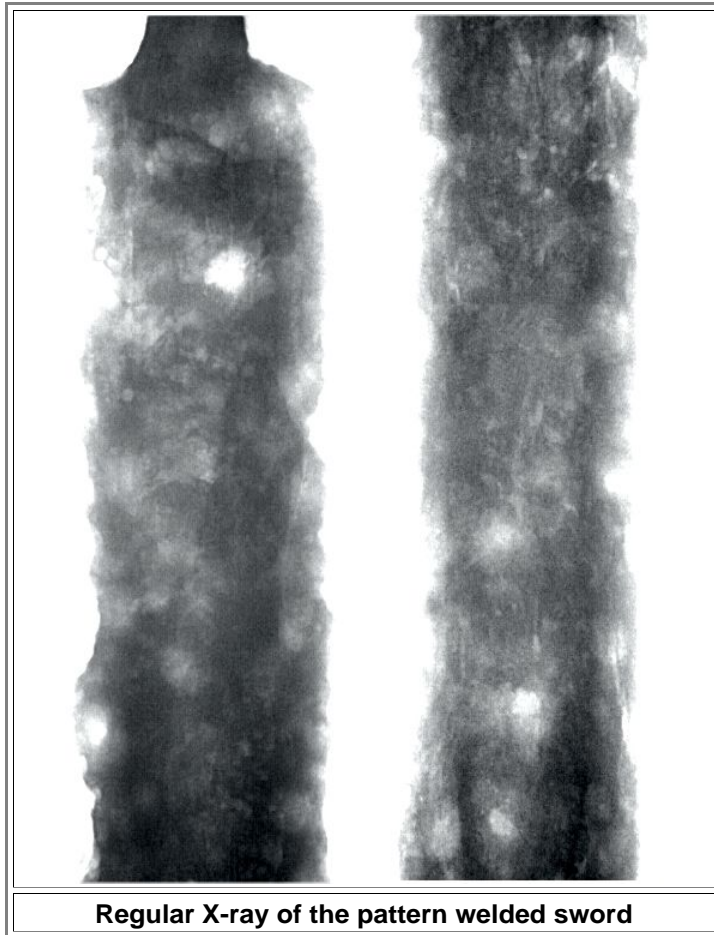
- Besides normal X-ray (and plenty of other methods like straight metallography) the author used **X-ray tomography** This allows to obtain a three-dimensional image of the object, showing whatever is visible to X-rays inside the object. Great to look at on a computer screen, where you can rotate the image and see it in all its glory, not so great for publishing with regular 2-dim. pictures. Here is one (more or less random) example: the sword in grave No. 2 in Warburg-Ossendorf; from around 570 AD. See p. 407 and p. 507 of the thesis. It is rather well preserved but you can't see any pattern welding on the surface.

Here is a picture of the sword together with a drawing:

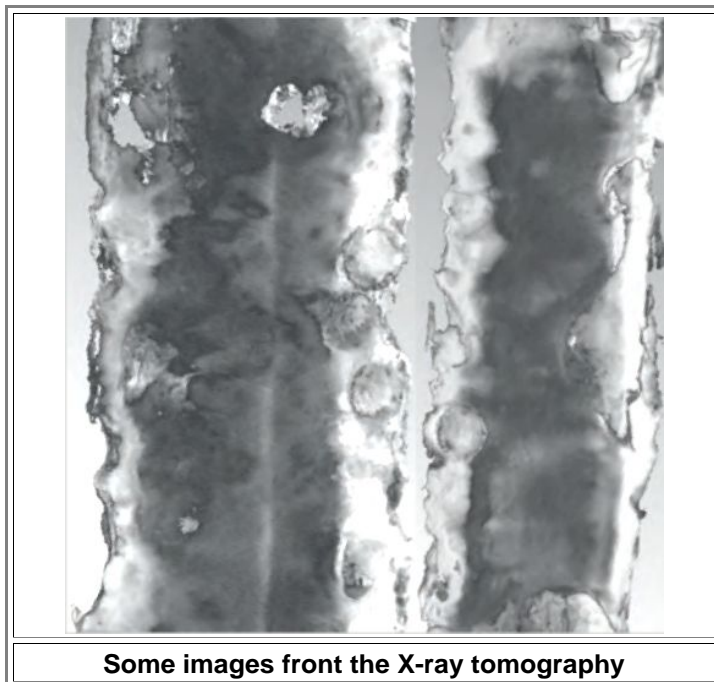


- You might wonder (like me) why the X-ray pictures show a heavily corroded / serrated edge of the blade while the pictures show an undamaged perfect blade. I asked Lehmann who replied that the blade was "restored" to look more perfect, obviously with some kind of plastic material that does not show in the X-rays.

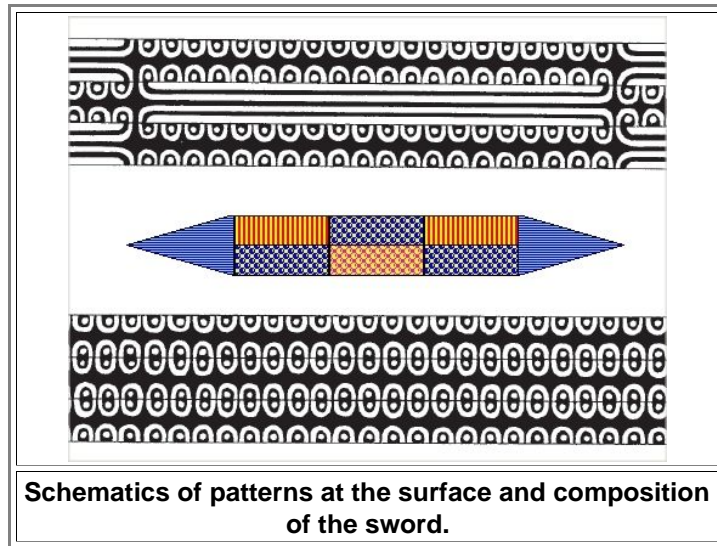
Next some straight x-ray pictures of parts of the blade. There isn't much to see, the structure more or less reflects thickness variations. In particular, it is not obvious that the sword was pattern welded



- Next two images from the tomography. You see that they are quite different from the regular X-ray but you do not see much of pattern-welded structure either.



- ▣ Nevertheless, using all the information from the tomography, Ulrich Lehmann was able to unravel the composition of the sword as shown below:
  - Six "striped rods" were used, containing twisted and straight parts, plus some hard steel for the cutting edges. Quite a complex blade!



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- <sup>1)</sup> **Ulrich Lehmann:** "Wurmbunte Klingen. Studien zu Konstruktion, Herstellung und Wertigkeit der frühmittelalterlichen Spatha in Westfalen".  
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