11.1.2 The Bronze Sword

Some Basics

Before I now go into swords proper, I want to make an important announcement that is valid for all that follows:

What follows is about the history and metallurgy of swords and not about killing people

- I have told you long ago why I am fascinated by swords. **Sir Richard Francis Burton**, an exceptional scientist, explorer and swordsman, wrote In 1884: "…. the history of the sword is the history of mankind". *I* do not share this sentiment (as far as I'm concerned it should be "…. the history of science and engineering is the history of mankind") but if *you* go with Burton - that's fine with me. You might have different reasons for being fascinated by swords that are also perfectly allright. However you better be clear about that. If you lean in this direction, you may not profit much from what follows.

What is there to know about bronze swords? My impression until recently was always: if you have seen one, you have seen all - in contrast to "real" swords. Not to mention that bronze as a material is just not very fascinating - in contrast to iron / steel once again.
Well, let's see if that is true:

Bronze swords in some museums
More bronze swords in museums
Large picture of "Schleswig" and Copenhagen swords.

Source: Copenhagen, Schleswig: Photographed there. London: Internet "Bronze Age Center"; William M. Athens: Internet at large.

Are they all alike? It's a matter of how closely you look. These sword are certainly more alike than their iron counterparts but there are also marked differences. By the way, well-kept bronze swords without the grime and patina of the millennia that makes them green or spotty, were objects of great beauty - look at the replica in this large picture or this special moduile to get an idea!
I give you just two things to look out for; oversimplifying a lot, of course:

1. How are hilt and blade connected? The three extremes are:

1. The cast blade has no tang and is riveted to a separately made bronze hilt. These swords are known as **Vollgriffschwerter** ("full grip swords") or "**Naue I type**; examples can be seen in the lower right above and right below.
2. The blade has a kind of tang or "tongue" to which the hilt pieces are fastened. By rivets or in the standard way of later iron swords. These are **Griffzungenschwerter** (Grip tongue sword); **Griffplattenschwerter** (grip plate sword) or "**Naue II type**"). Here is a particular nice one.
3. The blade and the hilt are made in one cast. These kinds are also counted under the No. 2 types above. You will see examples as you go along.

Julius Naue (1835 - 1907) was a German artist and (self-educated) archaeologist who contributed substantially to bronze age knowledge. The German names above were coined by him and later were "internationalized" by using his name. Unfortunately, the name "Vollgriffschwerter", literally "full-grip-sword" implies the opposite of what was intended and thus is used on occasion for the type 3 above.
Of course there are exceptions and in-between's, not to mention hot battles among archaeologists and normal people about this and that detail.

2. What kind of fighting style is the sword optimized for? This follows from the shape of the blade. The three simple cases are

1. Thrusting / stabbing *only*. Typically a slender very pointed blade with a strong midrib. Sometimes this kind of (early bronze) sword is also called rapier, again confusing all and sundry because they sure do not look like what one normally associates with that term.
2. Slashing / cutting. For slashing and cutting *only* you don't need a point. Most swords nevertheless have one, just not very pronounced and pointy.
3. Thrusting *and* slashing. The compromise.

Of course there are exceptions and in-between's, not to mention hot battles among archeologists and normal people, etc. etc.

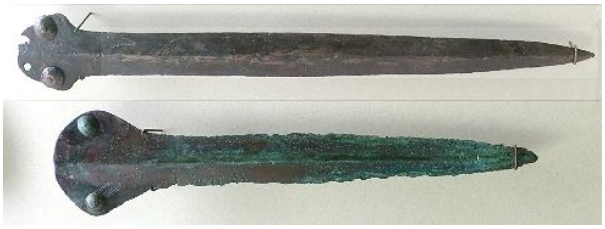
What seems not to be debated, amazingly enough, is that bronze swords "proper", as opposed to the Arslan Tepe swords, evolved out of daggers and first appeared (in bulk) around 1700 / 1600 BC in the Mediterranean, from where the technology spread. At this point it is necessary to refer to the excellent Internet pages of **Stefanie Gröner** and **Andrea Salimbeti**, which I have copied for you. Besides providing a wealth of material and illustrations, they also point out that there are some much earlier *copper* swords / daggers, too, e.g. from Naxos around 2800-2300 BC and from the Minoans at an unclear but early date.

Nebra (North Germany) swords (1600 BC)	Minoan swords / daggers 1600 or before Nebra sword detail
More daggers of similar style	
Source: Nebra: Internet / Wiki. Minoan swords	

- That there were bronze / copper swords before 1600 BC is good because the treasure hunters who in 1999 dug up the sensational "**Nebra sky disk**" in Sachsen-Anhalt in Germany (look it up here) also unearthed the two bronze swords shown above - and all this stuff was dated to around 1600 BC. Compared to the Mediterranean in general and the Greek islands in particular, Nebra in North Germany was a dark, dank and cold place - the pits, in other words. They could not possibly have invented swords there (the guys were East Germans and not Suebians!). But those Nebra swords are already rather perfect. If they do owe their existence to Mediterranean technology, it stands to reason that the guys down yonder in the South must have produced stuff like this *before* 1600 BC. We also learn (once more) that there must have been well established trade relations between the North and the South in those times. The North had amber and blond women to offer.
  As it happens, the "**Amber road**", going down from the Baltic by way of the Vistula and Dnieper rivers to Italy, Greece, the Black Sea, Syria and Egypt, was in place in 1600 BC, possibly even earlier. The breast ornament of King Tut contains large Baltic amber beads, for example. Bronze swords could have made it to the North coming up this trade route.

In fact, the North European bronze swords appeared rather early and, up to a point, are in a category of their own. Not only have we found far more than one might have expected, many of these swords seem to have undamaged blades but worn hilts, suggesting that they were fingered a lot but not actually used in fights. And we have quite a lot of them in "my" State Museum in Schleswig, Germany.

- Below are examples of "Vollgriffschwerter" or Naue I type swords, just like the Nebra swords above. It is clear that the riveted connection between the blade and the (not preserved) hilt is not able to withstand bending and shearing forces very well. Think of your garden hand shovel and you understand. Any forces not straight up or down the blade will tend to rip out the rivets - and that has happened a lot; one of the blades below shows that.



Vollgriffschwerter (Naue I) probably around 1600 BC
Large picture

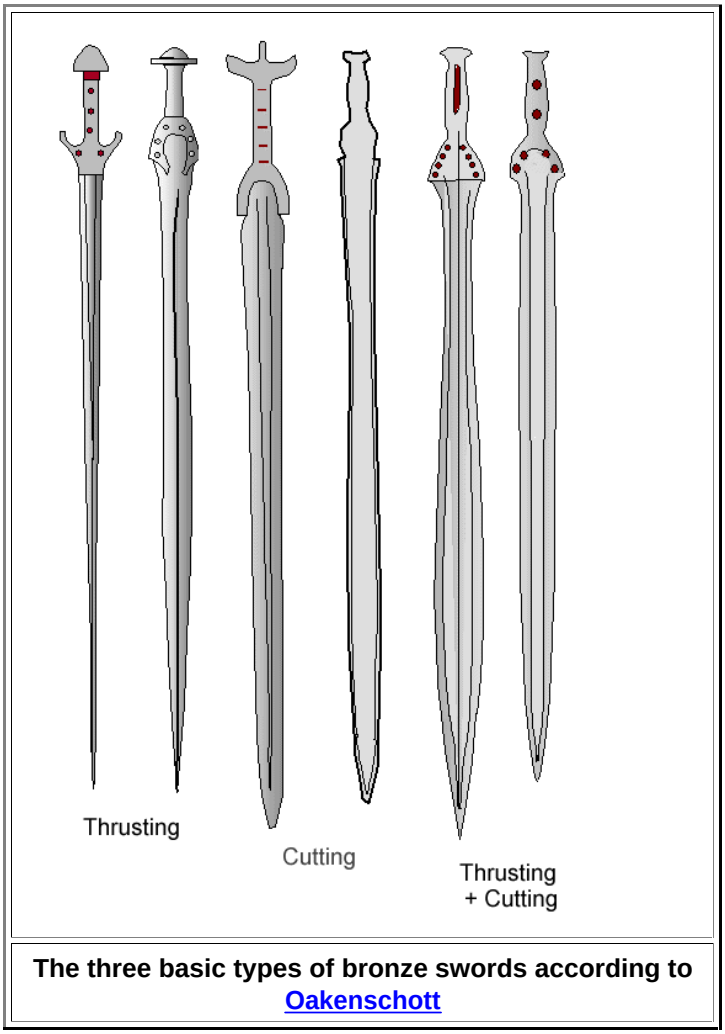
Source: Photographed at Schleswig-Holstein Landesmuseum, Schleswig, Germany

- And here are "Griffzungenschwerter" (Naue II) from a later but not disclosed time. Rivets are still used to fix hilt parts to the tang of the sword but they are no longer crucial for the mechanical behavior. The hilt now can neither come off nor bend.

Griffzungenschwert (Naue II) Schleswig
Large picture

Source: Photographed at Schleswig-Holstein Landesmuseum, Schleswig, Germany

Before I go on, let's get some idea of what distinguishes a straight double-edged thrusting *only* sword from a slashing *only* one; and how one could achieve a dual-use blade. The following drawing is taken straight out of Oakenschott's book:



The three basic types of bronze swords according to Oakenschott

These three kinds of blades may not look all that different to you - but that is deceptive! What you can't see is that the geometry of the cross-sections is also quite different. The thrusting sword has a thick ridge running down the center, while the cutting or slashing sword is more flat (lentil-shaped) if it doesn't have outright fullers, i.e. is even thinner in the center.
Of course you will also find anything in between the basic shapes given above. For example the **carp's tongue sword**.
Here are some real examples from Schleswig:

Thrusting, cutting and dual use swords

Source: Photographed at Schleswig-Holstein Landesmuseum, Schleswig, Germany

- Here are some swords predominantly for thrusting . Note the substantial and thick central ridge for all of them

Thrusting swords

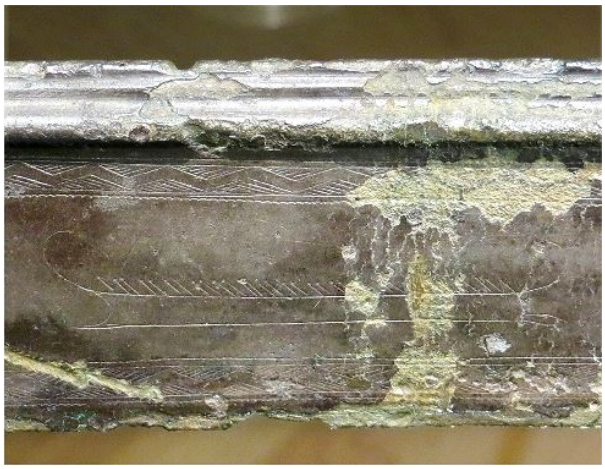
Large picture

Source: Photographed at Schleswig-Holstein Landesmuseum, Schleswig, Germany

Oakenschott makes a point that the first "true" swords or, if you like, very long knifes optimized and only used for fighting, were of the Naue I type with a thrusting kind of blade. In fact, Naue I type swords could *only* be used in a thrusting mode because they simply would come apart if you whack away with them. The rivet construction just could not take large shear forces perpendicular to the blade, in contrast to normal forces in the direction of the blade. That is certainly true, and many of the Naue I kind of swords actually do show damaged rivets and rivet holes.
Fighting by thrusting *only* is an acquired skill. The natural impulse is to slash around yourself. This might account for the damage - in the heat of battle you just loose control. So the Naue II sword with a secure hilt construction was developed that could survive slashing. Somewhat later came the dual-use sword. That is Oakenschott's viewpoint. It sounds reasonable and might even be true - up to a point!
However, my Schleswig-Holstein Landesmuseum begs to disagree. The experts there argue that long before swords were used in fighting, people were already whacking away at each other with axes or knifes fit to a pole at right angles. They were also stabbing and thrusting with lances but at close distance slashing was better. The first swords then were meant for slashing. Thrusting, as an acquired art needing plenty of discipline, came later. And indeed, there are very old one-edged swords definitely only good for slashing / cutting, see below. Sounds reasonable, too.
I don't have to offer anything to that topic myself. There is a puzzle, indeed, but it doesn't interest me very much. I have neither thrust nor slashed at an opponent with anything like a sword or knife so far, and I intend to keep it that way.
What puzzles and interests me is a purely technical point: The Naue I kind of swords / daggers in 1600 BC or so are products of an already quite advanced bronze technology. It would have been no problem to cast a blade with a hilt or at least a tang, as was done later with the Naue II kind of swords and with earlier swords of a different kind (see below) .
Why did those early sword makers go for an inferior design? All over the globe and for quite some time? It doesn't take a genius to do better, the technology was certainly available, so why? I do not know.

Some Specialities

All bronze swords look rather alike. They are all straight, double-edged and more or less pointy. Are they? Really all of them? Of course not. There are the exceptions to the rule as always in this business. Here is one of the more spectacular ones:



The Rørby swords
Top: With a **flint stone copy** as inset (More here).
Bottom: Detail of blade with ship decoration.

Source: Photographed in the National Museum of Denmark in Copenhagen.

- This sword (and another one exactly like it) was found in 1952 in a small bog at Rørby in western Zealand / Denmark. It is shown with a flint copy found somewhere else. The sword is dated to the beginning of the (Danish) bronze age around 1600 BC and thus is on the "old" side. The second sword found in 1957 at the same place is decorated with a picture of a ship. This is the oldest example of a ship image in Denmark.
  The swords were cast in one piece, obviously from the same mould. The two pins at the front end may serve to add weight to the optimal striking point, where the blade is also quite sharp. Oakenschott considers these swords as "clumsy, hideous, but most deadly". The Stockholm Museum has another one of this type but cast in a different mould.
  Note that the hilt of the Rørby sword is cast together with the blade, making it Naue II type. This goes right with my question from above. Why were all these technically inferior Naue I tpyes of swords / daggers ever made? Also note that this sword is decidedly a slashing sword. The fact that a flint stone copy exists indicates that these swords were precious and rare, but also that they were known far and wide. They might have been prestige imports from some (Southern) place with an advanced technology but nothing like these swords has been found anywhere else so far.

Then we have the **khopesh**, the **sickle sword**, popular in ancient Egypt and Mesopotamia.

King Tut's khopesh (ca. 1350 BC)
Large picture

Source: Internet at large

- The khopesh evolved form battle axes like this one and enjoyed some popularity in Mesopotamia and especially Egypt from at least 2000 BC to 1200 BC.
  Note once more that it is decidedly a slashing weapon.

Finally, a note must be made about **Greek swords**: the **xiphos**, **makheira** and **kopis**.

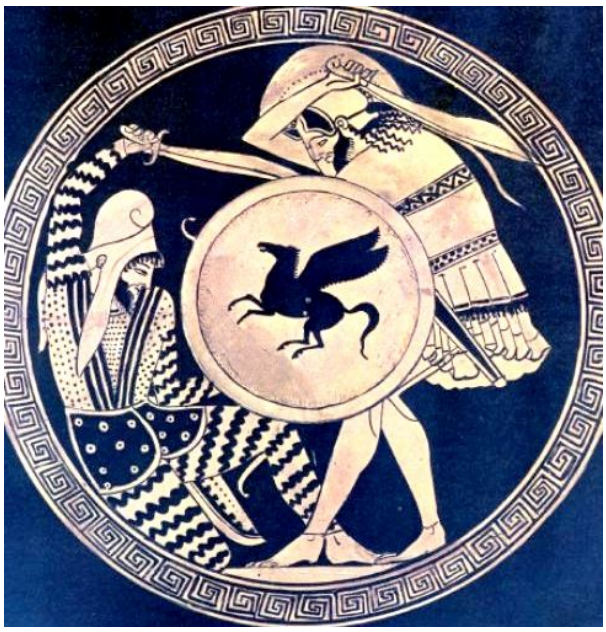
- The *xiphos* was the double-edged, one-handed straight and relatively short sword used by the ancient Greeks. It comes in bronze and later in iron and resembles the "classical" leaf-shaped bronze swords or the early Celtic ("Hallstatt") swords.

The Xiphos

Top: Some guy names Actaeon, attacked by his hounds, defends himself with a Xiphos. Detail from a Lucanian red-figure Greek vase (a "nestoris"), ca. 390-380 BC. Source: Wikipedia.

Bottom: The lot. About all surviving Xiphoi, it seems. Around 500 BC but with uncertain data. Source: General Internet; no details given.

Makheira is the term some Greek writers used for Celtic swords, for cutting type swords or just for swords with long blades. The word (and the sword type) Makhaira is a variant of the Greek word for battle, fighting.
About the same thing for the *kopis*; the name "kopis" might go back to the khopesh as shown above. The literature about these swords is a bit confusing and it appears that once more we have ancient pictures but not many artifacts. In any case, both types are single edged and relatively straight. If there is some curvature, it is concave. Here is a picture of warriors using kopis' as seen on the bottom of a drinking cup:



Greek hoplite (soldier) and Persian warrior fighting each other with kopis type of swords. 5th century B.C.

Similar picture from a vase

Source: National Archaeological Museum of Athens / Wikipedia

The pictures are of Greek origin so the Greek soldier ("Hoplite") is winning, of course. Interestingly his opponent has the same kind of sword.
Pictures are fine, real swords from the time in question are better. Unfortunately it is not easy to find the real things. That is also why we don't know if these swords were made from bronze or already from iron. Here is the best I could come up with:

Makheiras (top three) and a kopis / falcata as found in the Internet
More kopis pictures

Source: Internet at large

- The top three objects are Makheiras made from bronze; the bottom one is an (iron?) kopis. There are, however, also pictures showing makheiras that look similar to the kopis. The Greek kopis is practically identical to the Spanish falcata, always (?) made from iron, and used with memorable effect against the Romans.
  Note for the third time that these swords are primarily slashing / cutting weapons.
  The best way to see Greek swords is, of course, to visit **Greek museums**. Or is it? The link will tell.

Advanced Link

Greek Museums

- It is time to stop. We are already moving to iron swords that are closely related to their older bronze brethren. The typical long iron sword of the Celts, for example, is a straight evolution from their bronze cutting swords like some of the ones shown above.
  - What about the metallurgy? Why didn't I mention it? Because I covered it all before. The data in this link show what kind of copper / bronze technology existed in major areas at a given time, and, as in the case of iron / steel swords, one can be rather sure that bronze blades also reflected the best people could do with this alloy.

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1) Stefanie Gröner and Andrea Salimbeti: The Greek Age of Bronze Swords/Daggers; on-line: http://www.salimbeti.com/micenei/weapons1.htm. Here is a pdf copy of this article