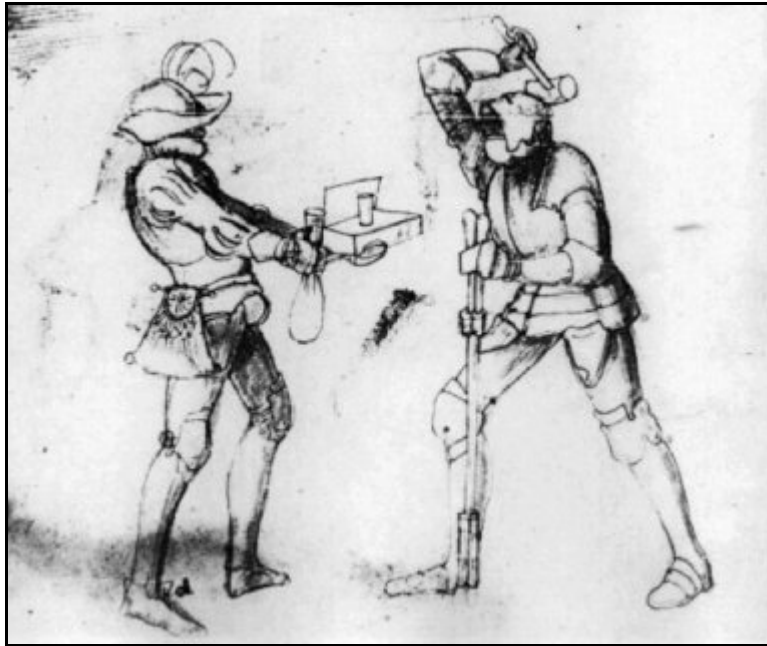


Fight-Book Clues to Quality and Build of Knightly Weaponry

by Jeffrey Hull

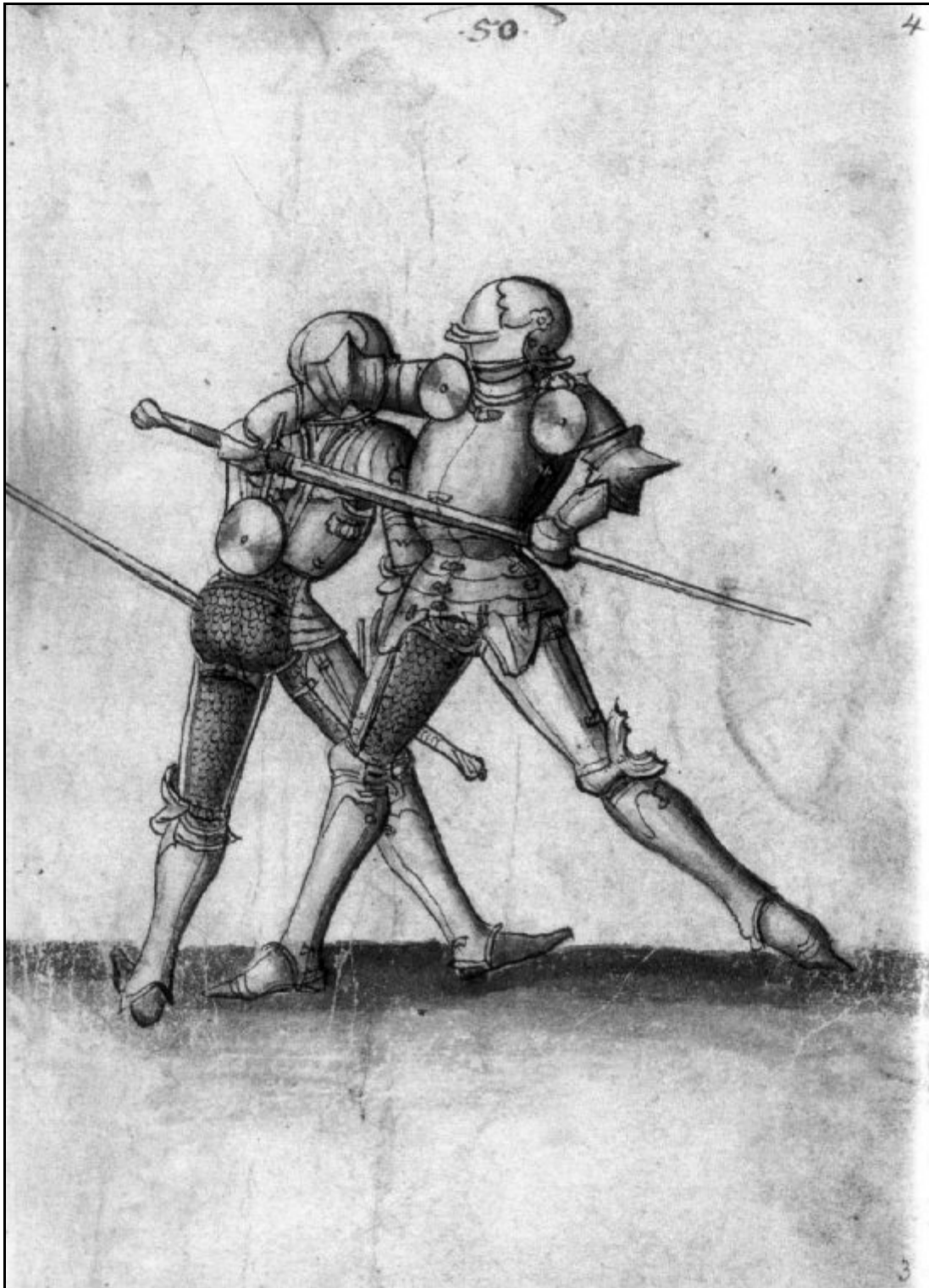


I chose to write this article as a way to explore what the German *Fechtbücher* (fight-books / fencing manuals) of circa 1375 to 1550 may tell us regarding the quality and build of knightly weaponry, primarily swords.

This is neither to say that this particular analysed corpus of fencing manuals gives us a complete picture of all armaments; nor provides the sort of technical specifications that are so highly sought by modern craftsmen; nor that the fight-masters always tell us things directly and explicitly; nor that the words and pictures of the paper & parchment artifacts are equivalent to a materials-testing ledger of many steely artifacts. Yet the old manuscripts ought to be considered carefully, since they tell us of past desiderata for armamentary quality and build. Such is of concern for justifying certain high standards that today's historical fencer and weaponry maker may have for modern replica weaponry.

Thus if someone with working knowledge of metalsmithing, source-language and fencing applies all that to a reasonably open-minded yet focused investigation and interpretation, then he must surely find some decent and accurate clues to the crafting of chivalric armaments. I would encourage others to experiment and test, to try and replicate any of the scenes presented in this essay – well, only so far as the law allows one to do so. I did my research with modern replicas of Medieval & Renaissance European weaponry well in mind, as such proof from the past is directly relevant to properly judging the quality and build of the modern stuff.

Which is just what I did, while realising that my interpretations of the fight-books may not find agreement with everyone everywhere. And perhaps also the following may be obvious stuff, even old news, to some scholars of hoplology and metallurgy – yet keep in mind that it helps for the obvious to be said every now and then, and that much of the following is new to those who are new to the study of arms and armour. ~



Solothurner Fechtbuch (MS S554) (1520)

This scene of two knights dueling portrays the kind of nicely wrought plate-harness and finely made longswords that were common enough among the fighting men of Germany, Austria, Hungary, Burgundy and Switzerland – indeed, throughout a great deal of Europe – circa 1450 to 1525. It is such armaments that are the focus of the present essay.

Force of *Zornhau*

We should have some idea of the force of the swordsman's mightiest full-body-driven long-edge downward diagonal strike with the *langes schwert* (longsword) – the *Zornhau* (wrath-hew) of German *bloszfechten* (unarmoured fighting). Many modern fencers conjecture about the force, energy, power and so forth of fencing strikes, yet rarely either show those at their best or calculate those with accuracy. Unfortunately, writing does not allow me to show you the forceful *Zornhau*, since obviously you cannot witness me doing said *Zornhau* – yet I can give you some calculation of the force of my *Zornhau*, plus some still-pictures thereof from an AVI.

This “ideal” *Zornhau* was done by means of footwork called *springen* (springing / leaping) and in movement of “true time” (thus sequentially arms-body-legs), and meant to cover the most distance in the least time as an attack done most likely *nach* and less likely *vor* or *indes*. This seems the seldomly advocated yet most forceful way to do this strike as per the German *fechtmeister*, its motion making the swordsman a fencing version of a pouncing leopard. (Whether it is tactically the best manner always to do so is certainly arguable – but that is not our focus here.)

Using some basic modern instruments – floor-scale, hanging scale, shock-cord, measuring tape, yard-stick, twine, digital camera & PC media player – we can measure factors needed for reasonably approximating the force of the *Zornhau* – mass, distance, time, velocity, acceleration. Comparisons of *Zornhau* to various other pertinent martial and athletic motions – iaido-katana cut, olympic javelin throw, baseball-bat swing and hockey-stick slapshot – were also done for purpose of reality check, and found to be within reasonable range of velocity & force among those.

We need to consider the “percussion-point” of my longsword (Type XIIIa) during the strike. The motion of that particular percussion-point is what counts. It is located 27 inches (about 69 cm) up from cross of the 33 inch (84 cm) blade of a sword of total length about 43 inches (109 cm). My arms help that percussion-point reach 30 inches (76 cm) more, and the bodily ascent sends it 18 inches (46 cm) further vertically. That percussion-point travels up & skyward from behind one's back, over & across, then down & earthward into the target of foe's body where his shoulder & neck meet – thus I strike foe with fully reaching arms and fully striding legs. Its motion is described by a parabola having directrix of 162 inches (411 cm), axis of 75 inches (191 cm) and arc of 231 inches (587 cm). The time it took to describe that actual arc was 0.20 seconds, discerned to have happened during 2 frames of the 10 frames-per-second AVI recording. Now, though my body-mass of 173.6 pounds (79 kilograms) plus my longsword of 3.4 pounds (1.54 kilograms) equals a total system-mass of 177 pounds (81 kilograms), what counts here is that only about one-half of the mass of the longsword (the “percussient”), thus 1.7 pounds (0.77 kg), gets exerted into the making of impact force. That small mass is amplified by speed and time into a much greater magnitude of force.

We may reckon two distinct forces: the “applied force” and the “impact force”. The first is the force the swordsman exerts to drive *Zornhau* and the second is the force exerted upon / into foe by impacting with the *Zornhau*. The first is what you “feel” gets put into the target via *Zornhau*, while the second is what you actually “do” put into the target to damage it via *Zornhau*. Those two forces have separate existences, and function independently of each other. The important one to consider and comprehend is “impact force”, for it does the work of hurting the foe.

Notice the applied force formula below is really a third-class lever formula. Notice the factors for impact force formula were hardest to obtain, and one is admittedly an estimate (deceleration time), since no actual foe was stricken by the sword (for obvious legal reasons). Lastly, none of this accounts for the magnifying of injury to foe's body due to the cleaving nature of a sharp sword's strike, thus the resultant severing damage to the foe's physiology, or addresses elasticity of collision, or armour resistance (thus force-negation), or wind resistance (thus friction), etc. But to keep things simple, we shall focus here on the “pure” force of the strike:

Applied force equals resistance force times resistance distance divided by applied distance:

$$F_A = F_R * D_R / D_A$$

$$23 \text{ pounds} * 33.5 \text{ inches} / 4 \text{ inches} = \text{about } 193 \text{ pounds-force (858 Newtons)}$$

Impact force equals percussient's applied mass times terminal velocity at target divided by deceleration time:

$$F_I = M_A * V_T / T_D$$

$$1.7 \text{ pounds} * 96.25 \text{ feet per second} / 0.07 \text{ second} = \text{about } 2337 \text{ pounds-force (10397 Newtons)}$$

Alrighty then – a lot of force clobbering the foe via ye olde *Zornhau*.

Fight-Book Clues to Quality and Build of Knightly Weaponry

(Refer to *Dynamics of Hand-Held Impact Weapons & Fight Science & Fight with All your Strength & Forces Between Bat and Ball & Human Weapon & Mythbusters & Preparing for the Specific Neuromuscular and Biomechanical Demands of the Javelin Throw & Slapshot & A Study of Softball Player Swing Speed & Meyer & Mair & Wilhalm in the Bibliography.* And thanks to GT and BW.)



Close-up of Zornhut leading to Zornhau



Fencing scene from *Kunst des Fechtens* by Joachim Meyer (1570)



JH does *Zornhau* (wrath-hew)

***Von Dem Herten* (1389)**

Although fencing lessons of Hanko Döbringer are the most famous part of his manuscript (Cod.HS.3227a), preceeding that in the manuscript are foliation (11r-12r) regarding the hardening, annealing and tempering of steel for weaponry and for tools (especially those that shaped the weaponry). Some works before and after *Von Dem Herten* did describe ferrous metallurgy – e.g. one of the thirty or so permutations of the notorious *Bellifortis* (Göttinger MS Philos.63) by Conrad Kyeser aus Eichstätt (1366-1405). Other works set general standards by law for weaponry hardness – in England the *Articles of the Bladesmiths* (10 Henry IV; AD 1408) decreed the following: *That every person of the said trade who is a worker or maker of lance-heads, swords, daggers or knives must make the points and edges thereof hard throughout to stand the assay; on pain of forfeiture thereof; also that every master shall put his own mark upon his work.* Yet the metallurgical passages of *Von Dem Herten* are curious for being associated with fencing lessons, thus lending it the strongly implied distinction of a sword-smith's formulations having a swordsman's approval for the quality of steely weaponry that such produced.

It is interesting that said formulations are assigned to “Master Alchemy”, thus their implied origin being the mysterious lands and cultures to the east and south beyond Europe – but quite honestly, with perhaps exception of the stanzas in Latin, such assignation likely was made to lend it the appeal and credibility of that contemporary pseudoscience / magic, yet owing little indeed thereto. It is likely these ferrous metallurgic formulations dated back to the *Völkerwanderung*, having been hard-won and understood by unnamed Germanic ironsmiths, passed down by those children of Wayland. Certainly they knew of the tempering properties of myriad things like proper charcoal-fire, mixing iron (*eisen* / *eizen*) with organic material when making billets (*mete* = “layered heaps”) of steel (*stol*), heating to colour, quenching in oil, blood, urine or turpentine, etcetera, without any need of Arabic texts to advance them from “barbarity”. Indeed, Germanic smith's developed pattern-welded steel and homogenous steel long before anybody touted the damascus steel of Araby as something supposedly new and supposedly superior to an historically forgetful modern Europe and America. Besides mention of the “Four Elements” and in turn mention of one of the “Four Spirits”, *sal ammoniac* (“salt of Ammon” / ammonium chloride), if there is anything “alchemical” to this lore, then it would be the transmutation of iron into steel, the transmutation of annealed steel into hardened steel, the transmutation of hardened steel into tempered steel. Yet, mundane explanation suffices for why the formulations may bring about such ferrous transmutations – a weapon with a certain hardness and resiliency is produced from a billet of steel created from iron and organic material; said billet is then put to both correct forge-work and heat-treatment using a quenching medium; said medium has a given viscosity and contains various organic material. Thus the strange formulations found in the following foliation. And one may note that some modern swordsmiths have confessed to sometimes using salt-baths, for example, so the mention of *sal ammoniac* ought not to be a total shock and surprise. Notice the mention of differential tempering (*in uenslete herten*).

Keep in mind that *herten* is a bit tricky – it may mean either “hardening” or “tempering”, depending very much upon context, at times arguable as to which. Amid all the MHD words notice the use of the rare MND *mete* (billet), plus notice that some Latin text mixes with German text – both characteristic of Döbringer's writing style. Please understand that the text called for some reasonable interpolation. For example, at start of the 16th stanza: *Wiltu dy herte von dem eizen entloezen* – that is literally “Would you loosen the hardness from the iron?”, yet that is contextually “Would you anneal the hardness of steel?”, which thus makes for a sensible translation. This may be explained by the tendency in prescientific / preindustrial times to think of steel as a purified form of iron, when in fact the opposite be true, since naturally steel is an alloy of carbon and iron, thus due to such confusion in the past there was sometimes conflation of terms, notably in compound-words for various armour. So even though correctly distinctive words for both iron (*eisen* / *eizen*) and steel (*stol*) were used, there was also sometimes the typical conflation of those terms during that time as indicated by the 16th, 17th & 18th stanzas.

A few random thoughts: It is interesting that mention of mundane tools is made along with that of swords – such would seem to hint that the master swordsmith, howsoever advanced, ought still be mindful of how to make the more lowly items of his craft. Also, the morbid mention of human blood for annealing has something of a parallel in a scene from *Moby Dick* where Ahab speaks of an “iron” (whaling harpoon) as tempered in blood.

Lastly, keep in mind that even if some of the formulations are questionable – although some can be verified as efficacious – they all bespeak the will to make hard-faced tools and hard-edged weaponry of high-quality steel.

<p>(11r) Von dem herten</p> <p>§ Nu spricht meister alkaym das dy erste herte ist allermeist yn kaldem wasser und dy ist gemeyne Und dy herte irkenne alzo wenne dy sneide blo ist zo hat is eyne rechte herte</p> <p>§ In laem wassere werde dy linden sneiden</p> <p>§ Senszen dy sal man in uenslete herten</p> <p>§ Ffeilen sal man in harne ader in leyn oele ader in buckes blute</p> <p>§ Dy hamer do man dy feilen mete hewet ader alle wofen und do man stol mete schroten wil dy herte alzo Nym eynteil rueberetich und eyn teil merretich und eynteil regenwuerme engerlinge und eyteil buckes blut wen der bok czu bruensten get dy herte hat dy vier elementen gar Das stos und eyn nander und druecke das wasser aus und was du denne dorynne herten wilt das sleiffe vor und herte is denne dorynne</p> <p>§ Was du denne gar herte haben wilt das welle mit gerebenem sande czweiteil und mit sweuel eyn teil auch gereben das wirt denne gar herte</p> <p>§ Wiltu denne gar eyne grosse herte machen so nym trachenwortz mit krawte und mit al und alzo vil eyserkrawtes und sewt daz in lawterm wasser und wenne das sere gesoten ist zo setcze is abe und laz is lawtern und gar kalt werden und herte denne dorynne was du wilt Und dy herte ist czu aller hande wofen gut</p> <p>§ Auch magstu herten yn senfe czu reben mit gutem essicg</p> <p>(11v) § Wiltu stol herten und gar gute sneiden machen zo nym buglossam blateloze mit worcze und mit al und sewt das in kaldem wasser und herte was du wilt.</p> <p>§ Wiltu hemer herten do man steyne mete mach hewt so nym rupan saff do lesche dy hemer gluende dorynne</p> <p>§ Eyne ander gute herte Nym der wuerme engerlinge czweiteil und regenworme das dritteteil und czu stos sy und drucke das saff durchein tuch Dorczu tu auch saff von steyn krawtes worzel und stos doryn eyn glueende eizen ader was du herten wilt</p>	<p>Regarding Hardening</p> <p>§1 Now speaks Master Alchemy, that the first hardening is most always in cold water – and that is common. And recongnise the hardening thusly – when the edge is blue, then it has rightly hardened.</p> <p>§2 In glue-water the edges becomes annealed.</p> <p>§3 Scythes – those one shall differentially temper.</p> <p>§4 Files – one shall harden those in urine or in linseed oil or in buck’s blood / ram’s blood.</p> <p>§5 The Hammers – wherewith one smites the files or all weaponry from billets and wherewith one smites scrap into steel billets – those will harden thusly: Take one part white radish, and one part horse-radish, and one part earthworms, one part cockchafer-grubs, and one part buck’s blood from when that buck goes to rutting. That hardening has the Four Elements indeed. So mash that together and squeeze out the liquid, and then what you would harden therein, rough-grind it and then harden it in that liquid.</p> <p>§6 Whatever then you indeed would have tempered, that then indeed will become tempered with two parts refined sand and with one part refined resin / turpentine</p> <p>§7 Would you then indeed make a great hardening of steel? Then take dragonwort with herbs and with ale / eels and likewise much vervain and sow that into lukewarm water and when that is well-boiled, then put it aside and let it lower, indeed, become cold, and then harden therein what you will. And that hardening is good for all hand-weapons.</p> <p>§8 Also, you may harden things in mustard. And for vining of steel – do it with good vinegar.</p> <p>§9 Would you harden steel and make really good edges? Then take borage – its leafless roots – with ale / eels, and sow that into cold water, and harden what you will.</p> <p>§10 Would you harden hammers, wherewith one hews heaps of stone? So take grub-juice and quench the glowing hammer therein.</p> <p>§11 One other good hardening: Take the worms – two parts cockchafer-grubs and three parts earthworms – and squish those and press the juice through cloth. Thereto add juice of rock-fern roots. Then thrust a glowing iron therein, or whatever else you would harden.</p>
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<p>§ Item capillos humanos coque in aqua donec sanguinis colorem habeat in qua si ferrum extingwetur mutatur in bonum calibem</p> <p>§ Item ad indurandum ferrum sumatur succus raphani et verbene et regenwuerme et destilletur que libet res per se et componantur equali pondere et tantum de lacte asine et candens in tali confectione ferrum extingwatur</p> <p>§ Item recipe raphanam et colophoniam et apium et ex hijs (!) extrahe succum equali pondere et intrude ferrum ignitum et erit durum ut lapis</p> <p>§ Item accipe sepum hircinum, cum vritur in amore et ferrum candens extingwe in eo et vertitur in maximam duritiam</p> <p>(12r) § Wiltu dy herte von dem eizen entloezen so nym menschen blut und los das sten bis das wasser dorof stet und wirt zo seige denne das wasser in eyn glas und halt das und wen du denne dy herte entloesen wilt zo nym das geherte wofen und halt das czu dem fewer bis das is zo heis werde das is das wasser slinde Zo strich das wasser mit eyner veder an dy sneide zo entlet sich dy herte und wirt linder</p> <p>§ Item wiltu eisen weich machen und czehe zo nym comomillen blumen eynteil und eyn teil kranches snabel das hat bloe bluten und eynteil veitbomes und das lege alles mit eynnander in heis wasser und tu is in eynen top und decke is das der brodem nicht aus moege gen und las is wol siden Dorynne lesche glueende eisen das wirt gar weich und czehe</p> <p>§ Item wiltu eizen weich machen zo nym horn und schabe das of eyn leder und menge das mit sal armoniaco und seiche dorof und winde das uem das eisen und laz das leder alzo of dem eisen vorbrueen zo wirt is weich</p>	<p>§12 Thus cook human hair in water until it has a bloody colour – if iron be quenched therein, then it mutates it to a good hardness.</p> <p>§13 Thus to harden iron: Take mashed radish and vervain and earthworms, and distill that, let the stuff thereby mix equally, pour in equal part of donkey-mare's milk and quench glowing iron in that confection.</p> <p>§14 Thus a recipe: Mash equal parts radish and turpentine and vinegar and wild celery and extract therefrom, and quench fiery iron and copper, so that each becomes as hard as stone.</p> <p>§15 Take buck's tallow, from when he is rutting lustily, and quench glowing iron therein, and it becomes maximumly hardened.</p> <p>§16 Would you anneal the hardness of steel? Then take human blood and let that stand until the water becomes evaporated, thus reduced. Then put that liquid / slurry into a glass and hold that and when you then would anneal hardness. So then take the hardened weapon and put that to the fire until that is become so hot that it gulps water when quenched. Then brush the water with a feather, thus the edge releases its hardness and becomes annealed.</p> <p>§17 Thus you would make steel pliable and malleable: So take one part camomile blooms, and one part cranesbill that has blue blossoms, and one part Mary's thistle, and put all that together into hot water. So do it in a pot, and cover it so that the steam may not get out, and let it simmer well. Quench glowing steel therein – that becomes quite pliable and malleable.</p> <p>§18 Thus you would make steel pliable: So take horn and scrape off the leather, and mix that with sal ammoniac, and piss thereupon, and wind that around the steel, and so let that chemical-soaked leather scorch the steel, thus it becomes pliable.</p>
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Fellowship of the Ring (New Zealand – 2001)

Narsil, the fantastical longsword of kings, shattered catastrophically in Tolkien's story, and needed elven magic to make it whole again. That meant some tricky welding and re-tempering indeed. Such blade-failure is best avoided.

Hanko “the Priest” Döbringer (1389)

Alright, in Hanko Döbringer’s famous interpretive commentary for the *bloszfechten* (unarmoured longsword fighting) of Johann Liechtenauer (1350-1420), one may find clues to wielder-expectations for the German longsword (*langes schwert*) of that time. Careful fathoming of the following statements by the Priest tells us about not only that weapon’s wielding, yet also its quality & build:

(15r) Auch wisse das eyn guter fechter sal vor allen sachen syn swert gewisse und sicher furen und fassen mit baiden henden czwischen gehilze und w e klos wen alzo helt her das swert vil sicher den das hers bey dem klosse vasset mit eyner hant Und slet auch vil harter und surer (!) alzo wen der klos ober wirft sich und swenkt sich noch dem slage das der slag vil harter dar kumpt den das her das swert mit dem klosse vasset Wen alzo czoge her den slag mit dem klosse weder das her nicht zo volkomlich und zo stark mochte dar komen Wen das swert (15v) ist recht zam eyn woge den ist eyn swert gros und swer zo mus der klos auch dornoch swer syn recht zam noch eyner wogen	Also wit, above all else, that a good fighter shall be certain of his longsword and shall direct it surely when he grabs it with both hands between cross and pommel – thus much more surely he holds the sword than if one of his hands grabs it by the pommel. And also he strikes much harder and thus more surely when the pommel rotates and swings itself into the strike – such that the strike arrives much harder than if the sword were grabbed by its pommel. Thus if one tugs the strike closely via the pommel, then instead that strike tends to arrive neither so fully nor so strongly. When the sword is rightly balanced, then it is a scale. A sword is great and heavy, so accordingly must its pommel be heavy. Rightly balanced, indeed a scale.
(19r) ...merke und wisse daz keyn dink an dem swerte Umbe zust funden und irdocht ist zunder eyn fechter den ort beide sneiden gehilze klos und als das am swerte ist nutzen sal noch dem (19v) als iczleichs syn sonderleichs gesetze hat yn der kunst des fechtens	...Mark and wit this – not any part of the longsword is vexing and ill-thought. Rather, a fighter uses the point, both edges, cross, and all of that sword to his benefit – indeed he does that formidably as his special domain in the art of fighting.

Those passages seem to me to have more than just their face-value. Döbringer tells us that you must be certain of your longsword – by which I think he means not just in its wielding, but also in its design and perhaps material. Of course, he deals primarily with martially technical aspects of swinging it properly – the fighter holding his sword by its handle with both hands and not with one of the hands upon the pommel; for sake of aim and power, do not tug the blade by pommel as one swings (because it is the *schwert* and not the *katana*); and realise all parts of the weapon are of use. Perhaps he also had the untold concern that holding the pommel during the strike puts tremendous stress, possibly deformative or even destructive, upon the underlying tang. However, that is pure conjecture, he says nothing to that effect of course, plus there is no reason to think that the longswords he worked with were any less of quality and build than those described and depicted in other later just-as-authoritative fight-books for *bloszfechten* or especially *harnischfechten* (armoured longsword fighting). Instead, it probably had to do with how the longswords of the Priest’s time tended to have wheel or disc pommels – a shape which, as one grips it to swing, diminishes the dynamics of the strike – unlike the scent-stopper and pear pommels of later more ergonomic shape, as found in Talhoffer’s time (seen in depictions later in this essay). So it was a concern of design rather than of material. Notice that Döbringer succinctly explains that the pommel does function to bring balance to the whole properly-made weapon, thus making it like unto a “scale” for sake of balancing both its weight and its rotational dynamics as one makes an edge-strike, especially when the impacting-area is within vicinity of the blade-tip, which is the verifiably ideal percussion-point. Lastly notice that Döbringer quite correctly explains that all the parts of the sword are well-designed, each with its own purpose, all made for the fighter to use them to his vantage.

(Thanks to GZ for the transcription.)

***Proto-Gladiatoria* (1425-30) and *Gladiatoria* (1435-40)**

These depictions and descriptions from the duel-fighting manuscripts MS KK5013 aka *Proto-Gladiatoria* (1425-30) and *Gladiatoria* (1435-40) are interesting.

The first image (3v) gives one an idea of the material-strength of the chivalric dagger, as the knight utilises it like a bar to intercept and divert a full-power sword-strike at the dagger's blade-flat. This image refutes the notion that swords could cut through other steely bladed weapons, snapping them like mere twigs with a powerful strike; plus it refutes the notion of edge-to-edge blocking as desirable defense. It is also remarkable that the knight grabs the blade with apparently ungauntleted hands. Although gloves are certainly a smart options, and are indeed mentioned often enough in texts for *harnischfechten*, this feat is actually something one may do safely with a replica of a knight's ballock- or rondel-dagger having the authentic cross-sectional geometry of a lengthy stabbing blade of the past, or for that matter, with an authentic replica of a longsword.

The second image (6r) contradicts the notion that there were never any thread-tapped / screw-mounted pommels on swords. We can see and read clearly below that the one knight has unscrewed his pommel from its tang so that he may throw it at the other knight. (Whether that tactic is always for the best is another matter.) Such modularity would also allow a variety of hilding for the sword-blade. Even more extreme mutability distinguishes the modular pollaxe of Talhoffer (1459) seen later in this essay.

Those two scenes from *Proto-Gladiatoria* (3v & 6r) do of course appear again in the later "final-draft", thus in *Gladiatoria* (4v & 7r). Those scenes from the earlier manual plus their text are presented with the equivalent scenes from the later manual (whose text is so very similar, that it is not included here).



Proto-Gladiatoria (1425-30)

<p>(3v) Merkch das Subent stukch das ir ped van den spyessen kämen seýt ob er zw seinem swert wër kämen und slüeg van krefftē nyder auff dich So nym deinen degenn in pede hent So vach den straich zwischen deiner peder hent auff den degen So kümst dw mit ym zw ringen vmb das swert</p>	<p>Mark the sixth play: This is when ye both have gotten away from the spears. If foe has gotten to his sword and strikes powerfully, down upon you, then take your dagger in both hands, thus catch the strike between both your hands upon the dagger. Thus you get around his sword and get to wrestling with him.</p>
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Gladiatoria (1435-40)



Proto-Gladiatoria (1425-30)

(6r) Merkch das zwelfft ab dw wiltdt reschlach mit ym entten So nymb deinen spyes und swert zw samb an den arme und schraw ab den knoph von deinem swert und wirff hertikchleichen in in und lauff nach dem würff mit im ein und nütze swert ader spyes welichs dir eben sey ab er also auff dich würff mit dem knoph So nym dein tatschen für dich und vach darauff den würff und nym den spyes für dich in dye richt hant zw dem stich und rett dich sein das er dir nicht ein lauff als ers in dem synne hatt

Mark this is the twelfth play: If you would rashly close with foe: Thus take your spear and sword together in your arm and screw off the pommel from your sword and throw it at him heartily, and interlope with him after the throw, and use sword or spear, whichever be fine by you. If foe thus would throw his pommel at you: Then put your targe before you and catch the throw thereupon and put the spear before you in the right hand, stab at him and be ready so that he not interlope you, as he has in mind to do.



Gladiatoria (1435-40)

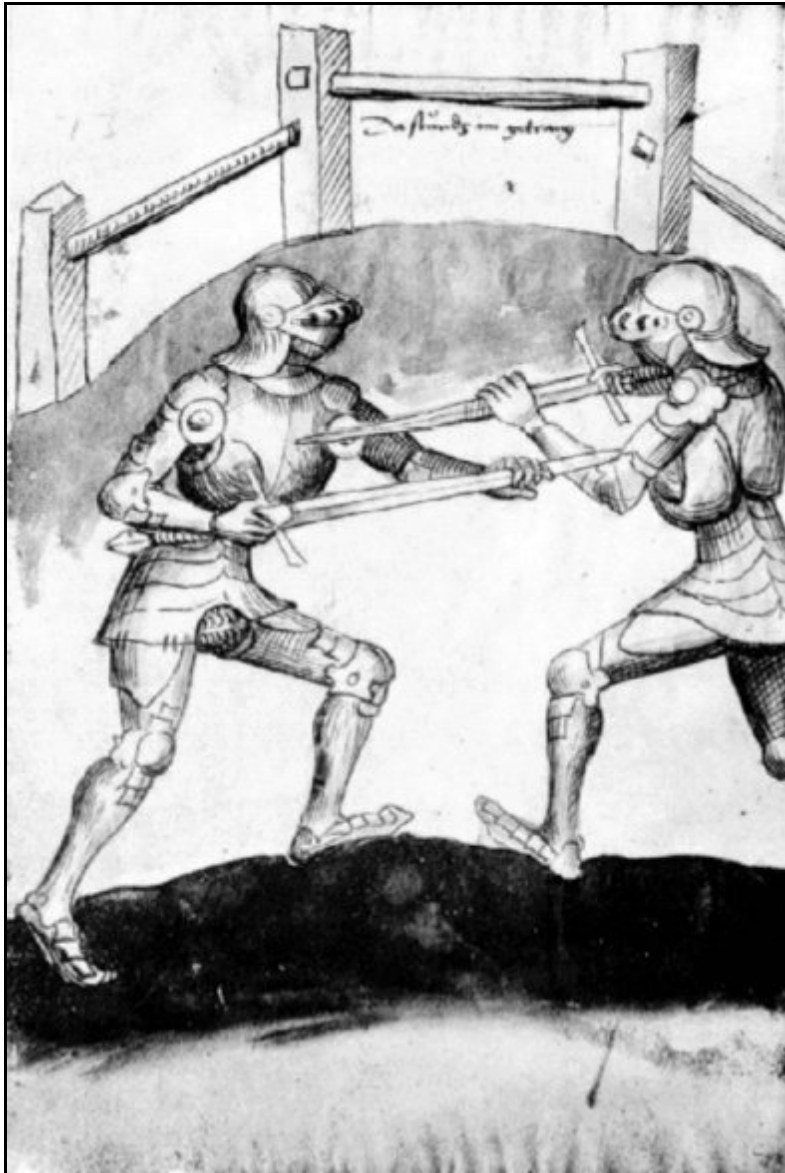
Hans Talhoffer (1450)

In the following imagery from plates of the *Fechtbuch* (1450-Ambraser) by Hans Talhoffer, we see interesting things related to quality and build of knightly weaponry, evincing much as to what was truly “battle-ready”, especially for armoured duel.



(11) Da fñrt er dem mort schlag	(11) There he directs the morte-strike...
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The one, the only, the *mortschlag* (morte-strike): To do this strike, all the way from overhead down into the fully armoured foe without wrecking one's longsword, requires a well-built weapon. The force delivered by the impact of the hilding upon a target is great. If someone does not think so, then think again. The stress to the sword is great, and I can attest that modern replicas very rarely survive the *mortschlag* versus reasonable practice-targets without shattering of the handle and deformative or destructive failure of the tang.



(23) Da ständ im getrang

(23) Those are stances for pressing.

Out of those stances each knight drives forth and presses his point into the other, most likely aiming at axillas, meaning to push the other back or off-balance and/or pierce his gaps. Again, there are great forces at work, all focused into and through the point of the longsword. The thing needed to be resiliently hard – thus not too flexible and certainly not floppy, something with some “spine” to it, of high-quality properly-tempered steel – to allow the wielder to be able to shove or drive back the foe wearing plate-armour, and hopefully pierce the maille in the gaps under the arm and in the axilla, thus the gussets, all without breaking his weapon.



(27) Da hat er verseczt und went Im den spiez In das visier

(27) There he has forset the strike and wends his point into the visor.

So the one knight drove his *langes schwert* high into first ward to forset the morte-strike of his foe at blade-flat, and forthwith wends the point to thrust into the foe's visor. So that one knight does something to defend himself in a smart blade-conserving manner: He does not statically block the other blade with the edge of his blade – rather he uses the nice broad flat of his blade to do the work of dynamically displacing that other blade. Yet he does expect the point of his blade to offend without snapping, so it must be hard enough to take the stress of wedging it into and through the slits of his foe's visor. It should go without saying that both knights have highly rational expectations that their respective blades shall not break, and that their hands shall not get cut even as they grip those blades, during these motions and impacts. Keep in mind that the longsword ought to endure *mortschlag* with the hilding as percussient – pommel, cross, handle – at least according to Andre Lignitzer (1452), as quoted later in this essay. Such handles (*bint / pint, gepint, hanthab, handlas*), as ascertained from artifactual research by Oakeshott and others, probably had a construction around the steely tang of hardwood, wrapped in chagrin or rawhide held fast with organic glue, finally bound together with cord, wire or metal banding. Thus as substantial as any handle for *katana*.

Hans Talhoffer (1459)

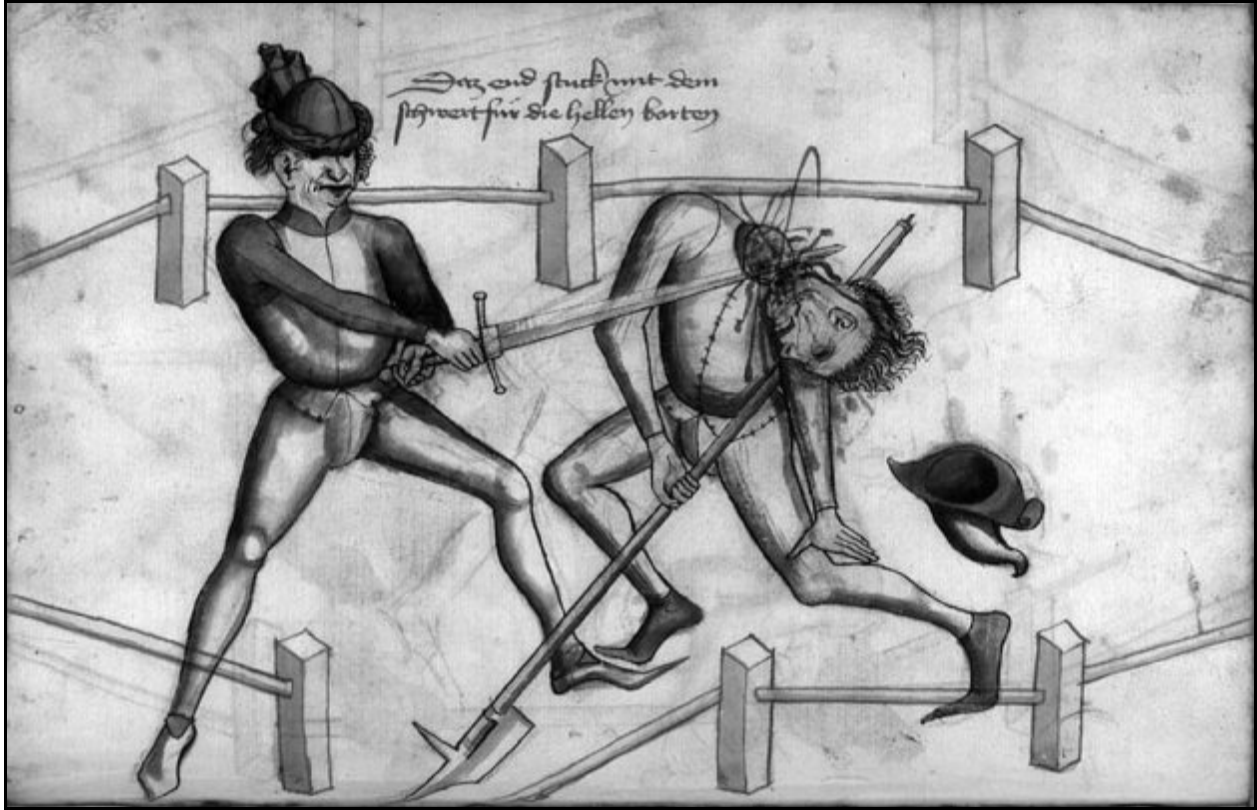
In the following imagery from folios of the *Fechtbuch* (1459-Thott) by Hans Talhoffer, we see interesting things related to quality and build of knightly weaponry, evincing much as to what was truly “battle-ready”.



(76r) Der oberhow fur den stich

(76r) The over-hew countering the thrust by spear.

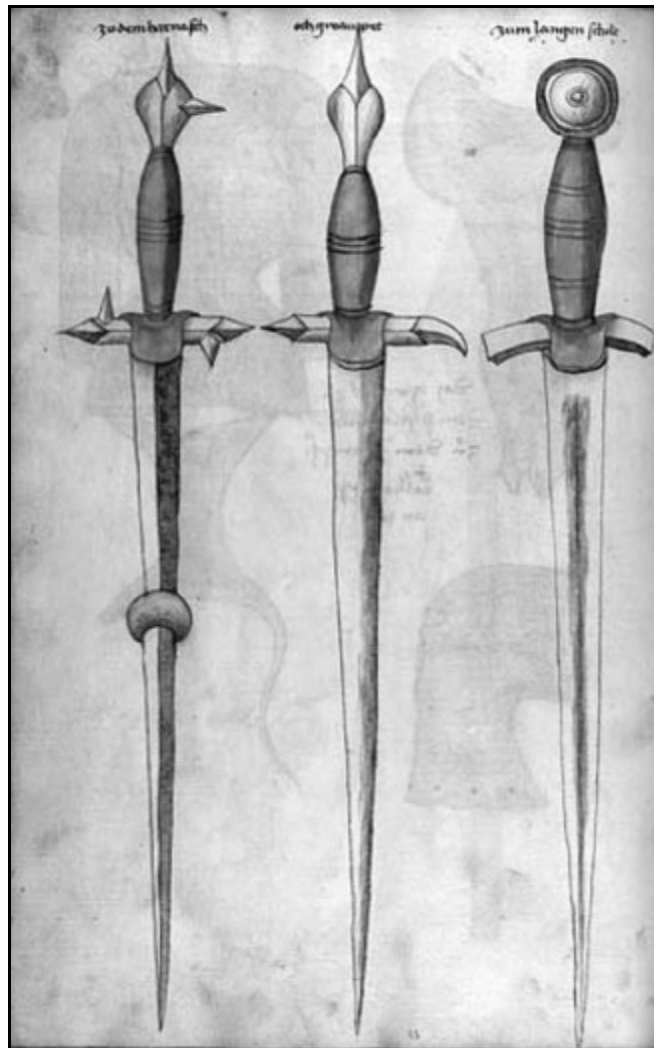
Apparently swordsman warded in changing-ward, and when spearman thrust low then swordsman under-hewed and broke spear-shaft as he trod back, and now wrath-hews as he treads forth. Since such spear-shafts were often made of ash-wood, a very hard and resilient material, then I suppose this one is arguable as to its plausibility. However, I have done or witnessed test- & practice-cutting with longswords hewing through saplings anywhere from 1 to 3 inches diameter. So this scene is plausible to me. If not indicative of a very hard yet resilient material for the blade, it is at least indicative of the desire for such in that time and place of 15th Century Germany.



(76v) Daz end stuck mit dem schwert für die hellen barten

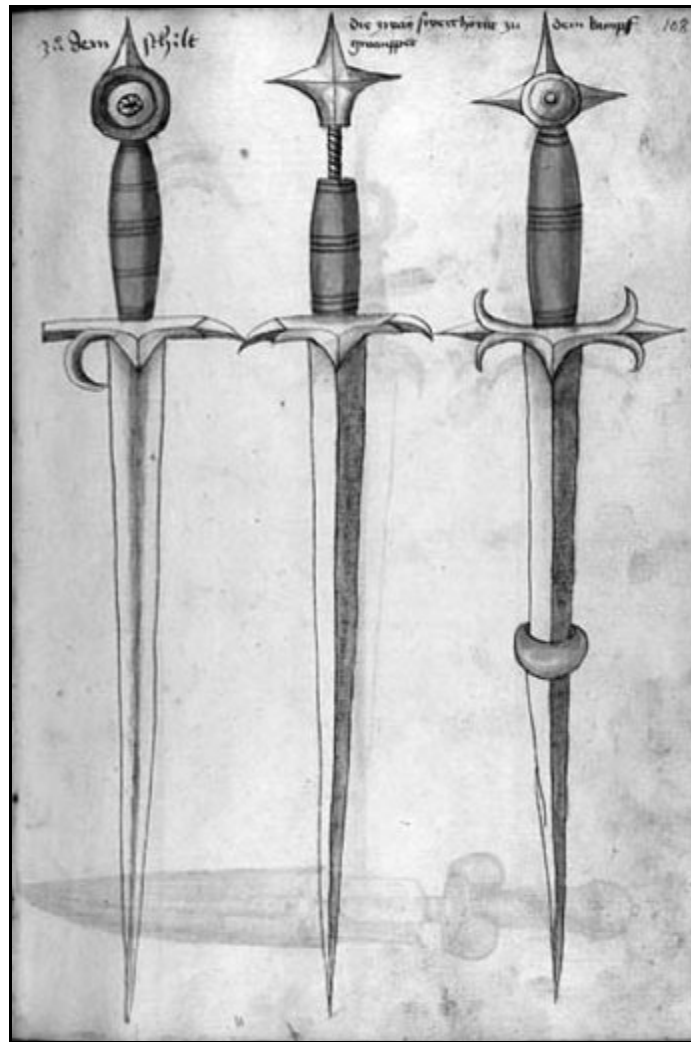
(76v) The ending play with the longsword countering the halberd by avoiding its over-hew while treading and crumple-hewing – thus gruesomely beheading the foe.

This sort of deed, a free-standing decapitation with a sword, was indeed achievable with the weaponry back then, and we have countless stories and pictures of such for centuries, despite how conveniently and smugly it is denied by various “experts”. I have seen an accomplished historical fencer swing his longsword and hew quite through the hanging spine-filled carcass of a deer. Such a deed requires a well-made sword with a hard resilient blade – not to mention strength, speed and skill. Such can be done and was done. For a gruesome yet non-murderous example of cutting prowess with a longsword view *Medieval Meat Cutters* (see the *Bibliography*), wherein one may view the complete hewing-through of the spine and flanking musculature of the hanging carcass of a harvested mule-deer.



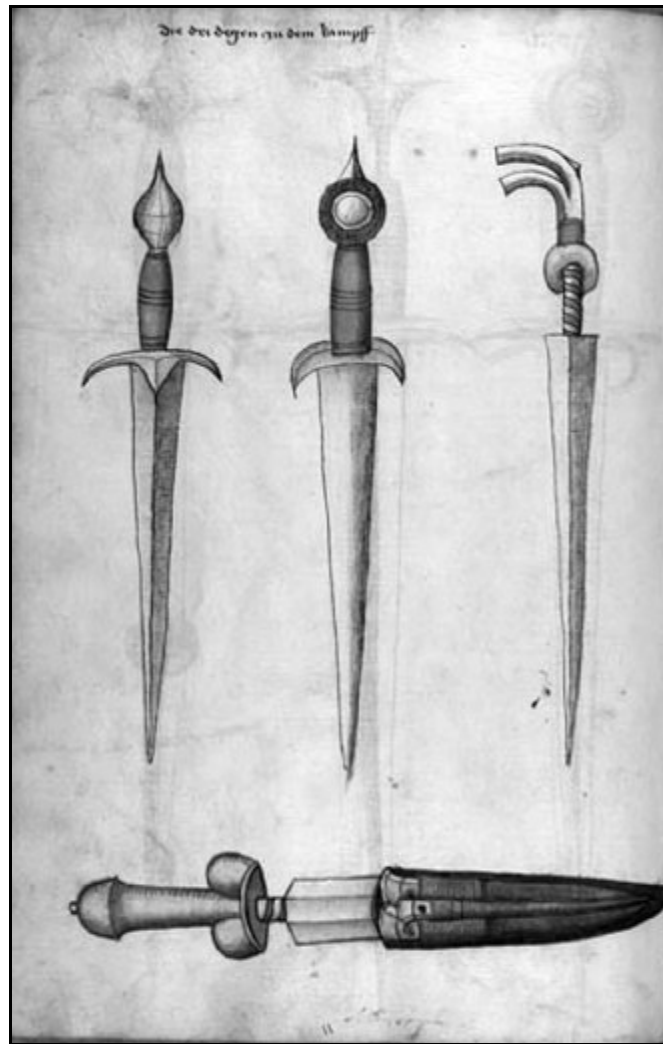
(107v) Zu dem harnasch - och gewappet - Zum langen schilt	(107v) Varieties of specialised dueling longswords / bastard-swords: For the harness...Yet also for any armoured dueling....And versus pavises.
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All these images bespeak high material quality and excellent build. To make a longsword for *kampffechten* (duel-fighting) was to make the ultimate longsword – something that could batter and perhaps pierce plate-armour. All the spikes and talons and points had to be hard, and the whole blade resilient, to give and take punishment in *harnischfechten* (armoured longsword fighting). The German sword, in all its variety during the 15th Century, was made with great craftsmanship of high quality steel; was resilient, hard and strong; and was the equal or better of any other sword in the history of the World. The longsword was the premier and fundamental weapon of Renaissance German martial arts. It is generally wielded with both hands, though sometimes with one hand; it is double-edged, broad and straight, generally tapering, usually diamond and/or partly fullered cross-sectioned; about 34 to 42 inches blade-length and 42 to 54 inches overall-length; 3 to 4 pounds of weight and well-balanced. The steel hilt was diverse, including lobed and spiky straight crosses; faceted scent-stopper, smooth pear, tetrahedron, wheel and even pointy diamond pommels. The grip around the tang was hardwood, wrapped in leather or wire. The steel blade was likely differentially sharpened. The various swords portrayed in the 15th Century fight-books – whether longswords, bastard-swords or shortswords – are classifiable in Oakeshott Typology as versions of XV, XVI, XVII and XVIII.



(108r) Zuo dem schilt – die zwän swerthörne zu gewappet – dem kampff	(108r) Some more varieties of specialised dueling longswords / bastard-swords: Versus pavises...Twain “sword-horns” for armoured fighting...For the duel.
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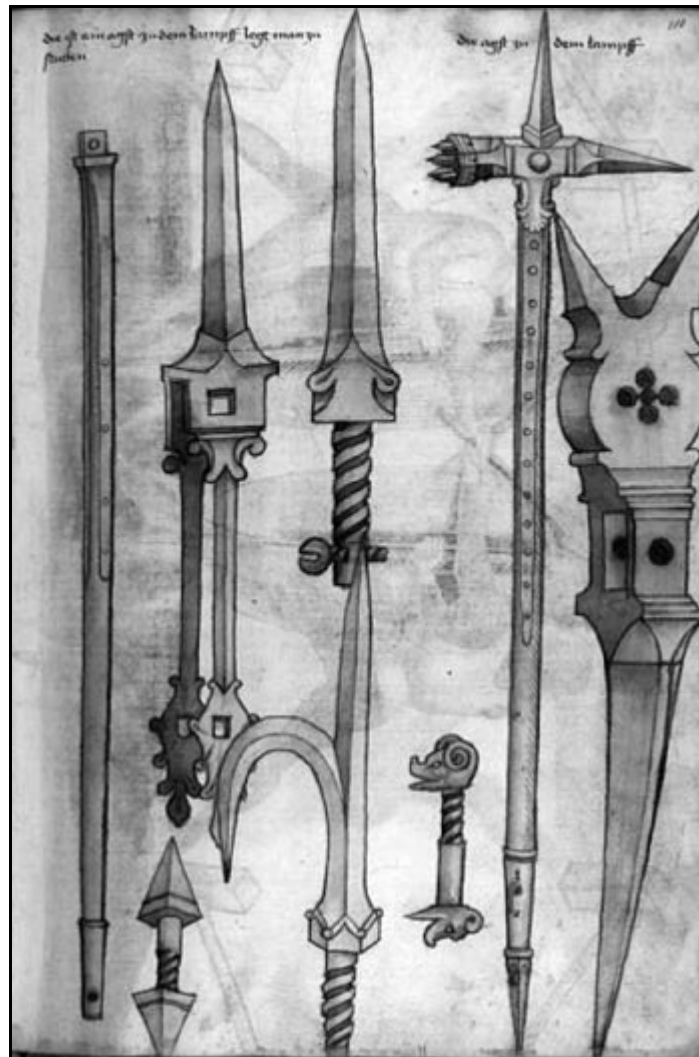
Talhoffer calls swords like these *gewappet* (armoured) in 107v-108r – meant for half-swording in armoured combat. In these folios notice the specialised dueling longswords with spiky hilt, as per 1443-Gothaer, *Fiore Dei Liberi* (1410) and *Codex Wallerstein* (1380-90 & 1450s). The specialised *kampfschwert* (as we may term it) as portrayed by Talhoffer in 1459-Thott has its later equivalent in the specialised *la spada da combatete in arme* as portrayed in 27v of *Arte Gladiatoria* by Filippo Vadi (1482-87). These longswords may even have been modular like the pollaxe in folio 110r. These longswords may even have been modular like the pollaxe in folio 110r (seen below). Notice one pommel in this folio 108r is screw-held instead of peen-held (as per MS KK5013 & *Gladiatoria*); and that one blade in each folios 107v & 108r has a “blade-bracelet”, acting as an extra guard for the forward hand during half-swording, held in place either by friction of wedges or even rivets. Also consider that these *kampfschwerter*, which Lexer acutely termed as *gladius bis acutus*, may have been one form of the tuck / estoc / stocco – thus such weapons needed stiffness and hardness for knightly foining combat.



(108v) die dri degen zu dem kampff...degen

(108v) The three daggers for dueling – dagger in sheath replete with throwing-blades and a spike.

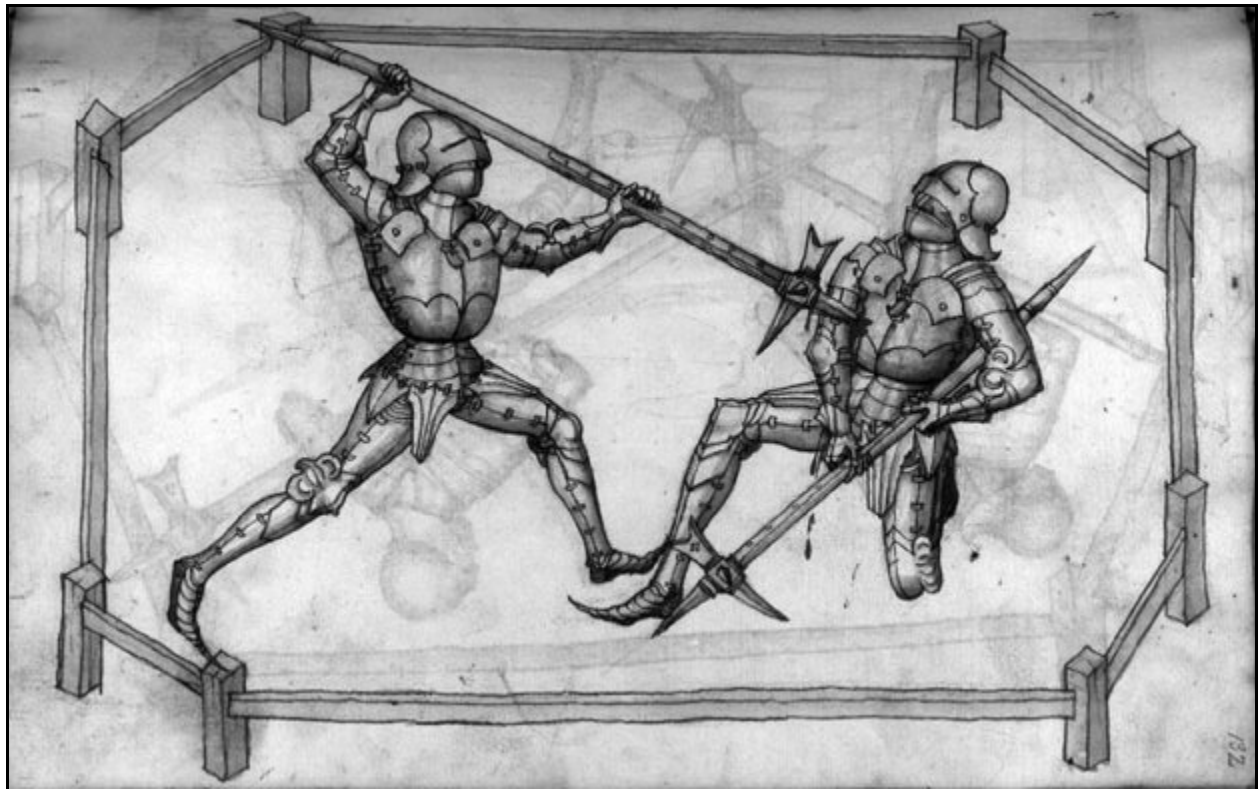
This folio shows special daggers for dueling. Two are spiky quillon-daggers; one is a split-tail-dagger, the tail serving as anti-plate pry-bar; two disassemble; and interestingly none are rondel-hilted. There is another for everyday fighting, an archaic ballock-dagger, similar to those seen elsewhere in 1459-Thott edition, with screw-held hilding, with sheath integrating two extra throwing-blades and a spike featuring either a finger-loop or poison-duct. It may be remarked here that the humble dagger along with sword and spear were three main weapons of chivalric dueling in Germany – as those were in England, France and elsewhere in Europe.



(110r) dis ist ain agst zu dem kampff legt man zu stichen
– die agst zu dem kampff

(110r) This is a modularly and optionally assembled pollaxe for the duel, with which one lays low his foe by stabbing thus it serves also like spear and/or gaff...This axe is assembled and ready for dueling.

This modular pollaxe for dueling has the standard luzern head, as well as options for spear and/or gaff, any whereof assembles together with various spikes, all interlocking together with langets and threaded beast-head rivets to secure to the shaft. If anything, to make this sort of weapon workable requires a high quality of material for its build. This sort of build makes for a nicely portable pole-arm that is easy transport to dueling place or of course battlefield – not unlike having a break-down recurve-bow for ease of transport to the archery range. One may note that the pollaxe was apparently the most popular alternative to the main three dueling weapons when allowed and agreed by the parties concerned, not just in Germany, but also in France and England. A further remarkable thing is that even as Italian armour was popular among some knights in England for dueling and war during kingship of Richard II (1377-99), likewise popular were German arms – thus it seems every can has its appropriate can-opener.



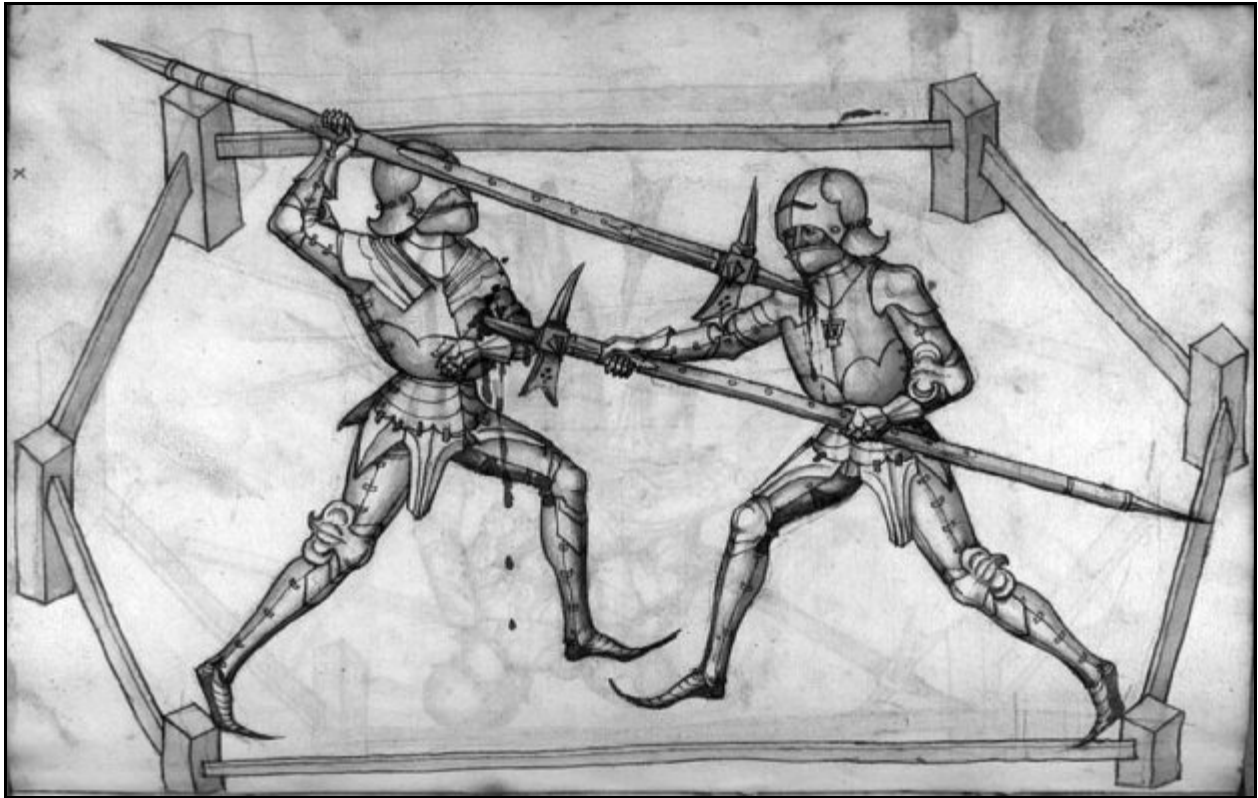
(132r) *No text*

(132r) Leftman forsets and thrusts to rightman's flank.

Okay, here is that pollaxe put to use. It seems that the point of the pollaxe has wedged through the seam over the axilla, between the two of the staples linking breast-carapace to back-carapace. Since the links of what little maille there was in full suits of 15th Century armour could be pierced & burst with the point of the well-made sword, you may notice that these suits have no such steely mesh covering their gaps, virtually if not literally being “full-plate armour” in the strictest sense of that phrase. To get through this advanced design of harness, with no need of maille gussets the knights must pry into and pierce what gaps it had – the seams where the spring-tempered plates meet.

So the gaps that they targeted in the cuirass would be much the same locationally compared to earlier harness, yet differed structurally and so were smaller to access and tougher to pierce than earlier gussets. To pry and pierce the gaps betwixt breast-plate and back-plate effectively required the point of the pollaxe to be quite hard, and the same probably went for the beak and the hammer.

The German plate-armour harness portrayed here was custom-fitted and had even mass-distribution. Along with its arming-clothes, such well-articulated harness may have weighed only about 55 pounds. It allowed the man wearing it to run, jump, roll, cartwheel, vault, and even fall down then stand up again. It was not an overly-heavy, clumsy hindrance; it did protect quite well from cleaving strikes; and it was made of steel. Such was the craftwork of various centers of great German armourer-guilds of 14th-16th Centuries – Augsburg, Innsbruck, Landshut, Nürnberg.



(134v) *No text*

(134v) Leftman's left arm was perhaps wounded – So rightman rushes forth to thrust from beneath with his pollaxe – Yet leftman counters by thrusting from above with his pollaxe – Thus both fighters wound each other badly, perhaps mortally.

Here again, piercing through the seams is evident, at least on the knight who got hit low, either between the breast-carapace and back-carapace, or between breast-carapace and breast-plastron. Yet the other knight, who got hit high, got pierced either between bevor and breast-carapace, or apparently somehow pierced through the plate of breast-carapace. If such a one-armed thrust through plate-armour was ever achieved in the history of dueling – as this scene evinces – then it would be incredible indeed, however doubtful. Such bespeaks the reality of and/or desire for weaponry in times past made of material equivalent to modern tool-steels. A respected colleague of mine has a forthcoming article which, among many other things, treats of this idea of the possibility of actual armour-piercing by certain hand-held weaponry as indicated by certain fight-books – so I may say no more presently.

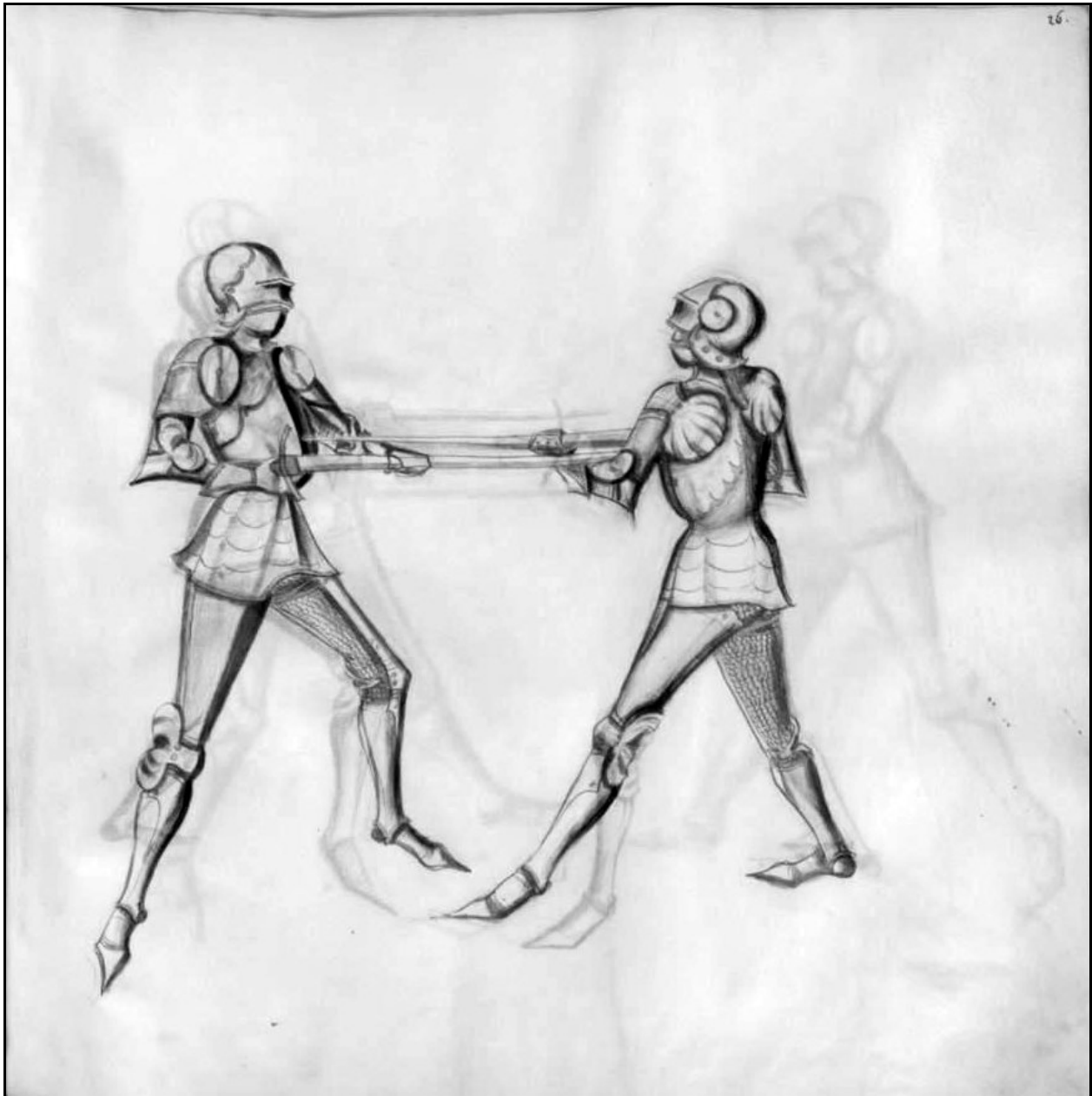
Andre Lignitzer (1452)

The following text is from the unillustrated *Von Danzig Fechtbuch* (1452). It deals with *kurzes schwert* (shortened-sword / half-sword) fencing, whereby one grips the handle and the blade of the longsword to do *stichen* (stabbing / thrusting) and other moves efficacious to *harnischfechten* – like *reissen* (wrenching) and *mortschlag* (morte-strike). The following *stuecke* (plays) speak to the high standard of quality and build that were desired in a longsword of that time & place – thus made with a unified design having the requisite hardness and resiliency to withstand a variety of stresses and shocks while helping the knight wielding it achieve his victory. Indeed, these passages speak for themselves. Notice that “handle” is meant by *pint*, a word that connotes “binding”.

<p>(73r) Daß erst stuck Item stich ym Inwendig zw^o seine gesicht / Wert er dir daß / So var durch vnd setz ym aufwendig in sein gesicht / Wert er dir daß fürpaß / vnd streicht dir den ort also ab so wind mit deinem knopf ym vber sein rechte achsel / vnd spring mit dem rechten pain hinter sein linkß / vnd würf yn vber ruck ~</p>	<p>The first play Thus stab at foe inside to his face – if he wards that, then move past and set upon him outside to his face. He wards that further and swats your point – so wind with your pommel toward him over his right shoulder, and with the right leg spring behind his left leg, and throw him backward.</p>
<p>(74v) Daß erst reissen Item stich ym Inwendig zw dem gesicht Wert er dir daß / vnd setzt dir den stich ab / So wind mit deine knopf von vnden auf auf dein lincke seittn / vnd oben vber sein swertz klingen zwischen sein paide hend / vnd reiß vast an dich / So reistu in sein lincke hant von der klingen / So stich ym denn zw^o dem gemächt / Ist er dir zw starck daß dw Im die hant von dem swert nicht gereissen magst / So wind mit deinem knopf aber von vnden auf auf dein rechte seittn vber sein lincke hant / vnd stoß in mit der klingen in sein lincke seitten von dir</p>	<p>The first wrenching Thus stab at foe inside to the face. Yet he wards that, and offsets your stab. So wind with your pommel from under, up upon his left side, and high over his sword-blade, between both his hands, and wrench tightly to you – thus you wrench his left hand from the blade – so then stab him to the bollix. But is he too strong, such that you may not wrench the sword from his hands? Then wind with your pommel again from under, up upon his right side, over his left hand, and shove him from you with the blade into his left side.</p>
<p>(78r) Hye heben sich an die mortschleg Der erst mortschlag tritt vast In in / vnd tûe sam dw in Inwendig zw dem gesicht wellest stechen / vnd laß denn dein rechte hant varen vonn deinem pint / vnd kum do mit deiner lincken hant zw^o hilff in die swertz klingen / vnd slach in mit dem knopf oder mit dem gehultz / oder mit dem pint zû seine haubt ~</p>	<p>Thus here start the morte-strikes The first morte-strike Tread closely to foe and juxtapose inside as if you would stab to face. Then let your right hand move from your handle and go therewith to help your left hand upon the sword-blade, and strike him with the pommel or with the cross or with the handle, to his head.</p>
<p>(78v) Der fünfft mortsclagk Item tûe aber sam du ym wilt an setzen (79r) Inwendig in daß gesicht / vnd slach In mit dem knopf nyden in seine lincken enckel Ein pruch da wider Item wer dir zw dem lincken enckel schlecht / So laß dein swert varn pey dem knopf / vnd mit dem pint in die erd / So vechstu den slagk in daß gehultz / vnd spring rasch mit deine rechten pain hinter sein lincke seitten / So gewinstu ym den ruck an Vier an setzen Gee rasch in In / vnd setz ym an sein gesicht / oder an den halß / oder an sein prust / oder vnder sein linckeß vchsen ~</p>	<p>The fifth morte-strike Thus juxtapose as if you would attack foe inside to the face, and instead strike him with the pommel underneath, into his left ankle. One counter against that Thus someone strikes at you to the ankle. So let your sword move forth by its pommel and with the handle into the earth – so you catch that strike in the cross – and spring swiftly with your right leg behind his left side, thus you move into him and have won. Four attacks Go swiftly into foe and attack him with the point at his face or at the throat or at his breast or under his left axilla.</p>

(Thanks to MM for the transcription.)

Paulus Kal (1462)



(26r) *No text*

(26) Those are stances for pressing.

Pretty much the same as plate 23 of Talhoffer's 1450-Ambraser seen previously. This redundancy is provided here to reinforce how more than one master expected the same functionality from his weaponry.



[(41r) ...oder ryße Jne bey dem hals]	[(41r) ...or wrench foe by the throat.]
(41v) Das ryßen get aus dem vorgeschriben stück	(41v) The wrenching comes from the aforesaid play.

So the idea of showing this scene is simply this – the pollaxe had to be built well enough that its rivets and langets did not splinter the hard-wood shaft (probably of ash or hickory) and fly apart during the violent stress of hooking the throat / neck of the foe with the beak and wrenching his body therewith. Almost nobody nowadays makes a decent pollaxe to such standards.

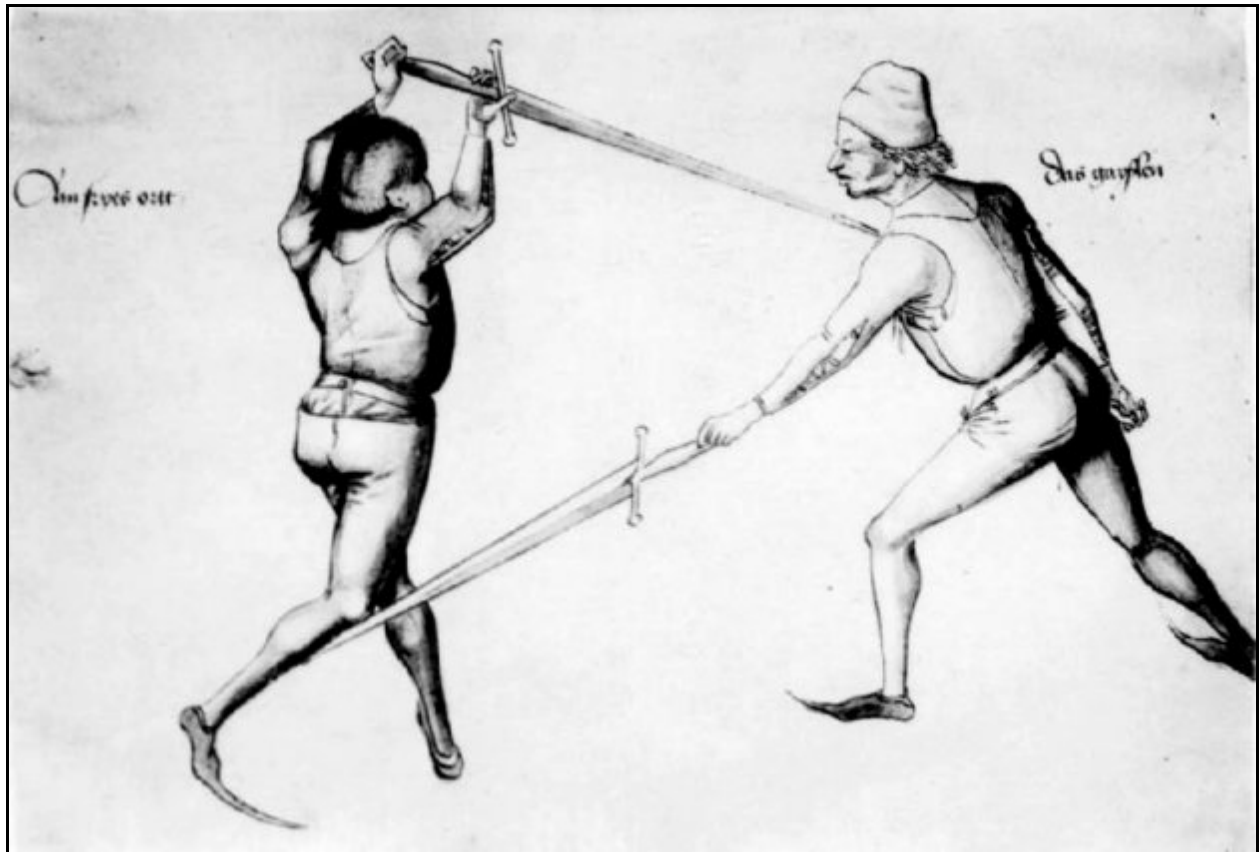


(59r) Zorn hauwe ort ym dratt	(59r) Wrath-hew becomes the point that threatens foe.
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Ah yes, the often misunderstood *versetzen* (forsetting / displacing / parrying) of German longsword. This picture portrays Kal's version of a particular defence-as-offence with which other masters like Ringeck and Talhoffer also dealt via their similar or modified versions. Whoever and however, the set-up and result are always the same – the foe hews from above so the fighter treads properly as he gains the correct angle while he strikes the foe's blade-flat with his blade's long-edge and flows into driving a thrust to his face or upper torso. Obviously, to achieve this, the fighter must have a sword that may withstand the force of his own *zornhau* meeting the force of foe's sword's *oberhau*. His longsword must meet edge-to-flat without flattening, folding or crumpling. That is a reasonable standard of quality and build. What is not a reasonable standard is to expect said sword to survive the parry done wrongly – bashing edge-to-edge, so that one guarantees that the sword's edge suffers nicking, cracking, gouging or even breaking. That is the metallurgical, physical, martial fact of what happens because of preferentially done edge-to-edge abuse of and disrespect for one's sword. It can, shall and does happen whether the sword is a German *langes schwert*, a Japanese *katana*, or a Chinese *jian*. Physics works the same in every culture.

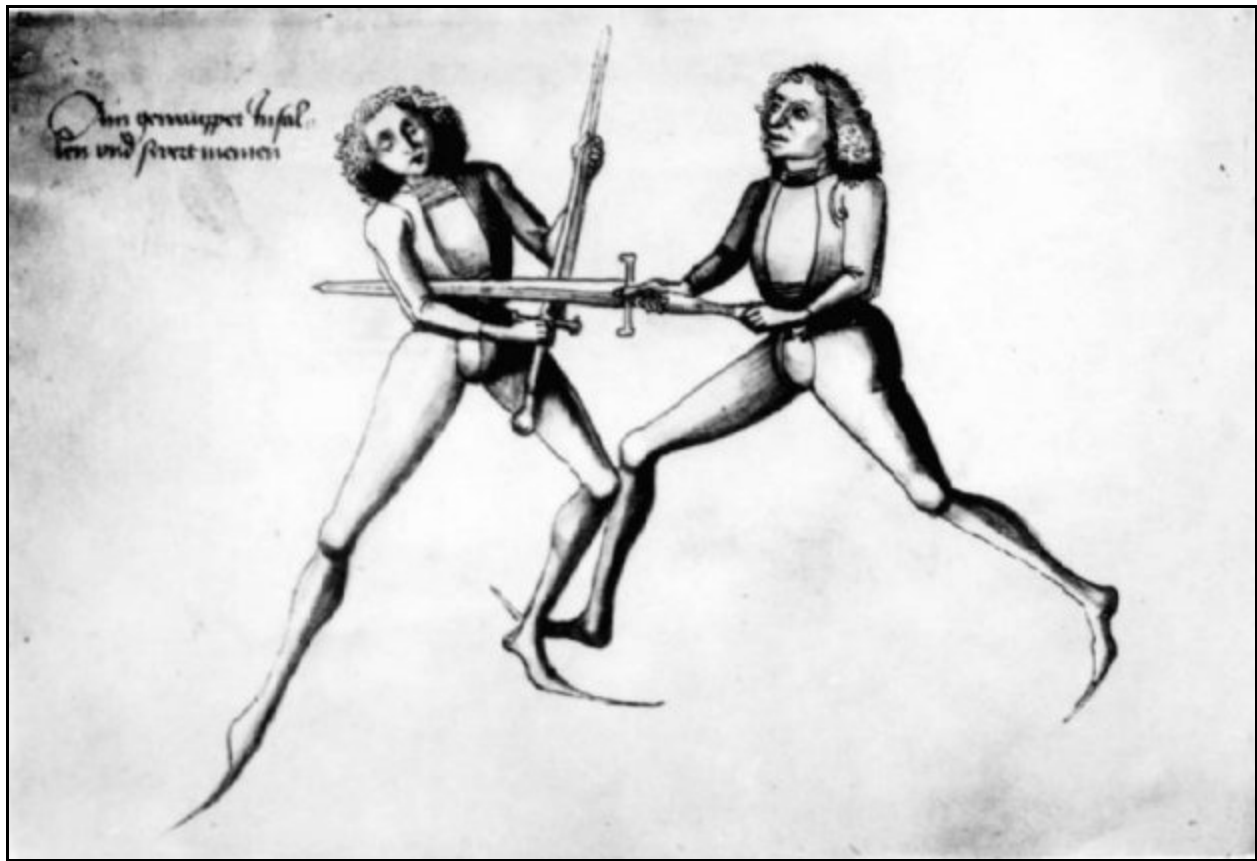
Hans Talhoffer (1467)

Again, in the following imagery from plates of the *Fechtbuch* (1467-Gothaer) by Hans Talhoffer, we see interesting things related to quality and build of knightly weaponry, evincing much as to what was truly “battle-ready”.



(10) Ain fryes ortt – Das gayslen	(10) A free point / thrust – The whip
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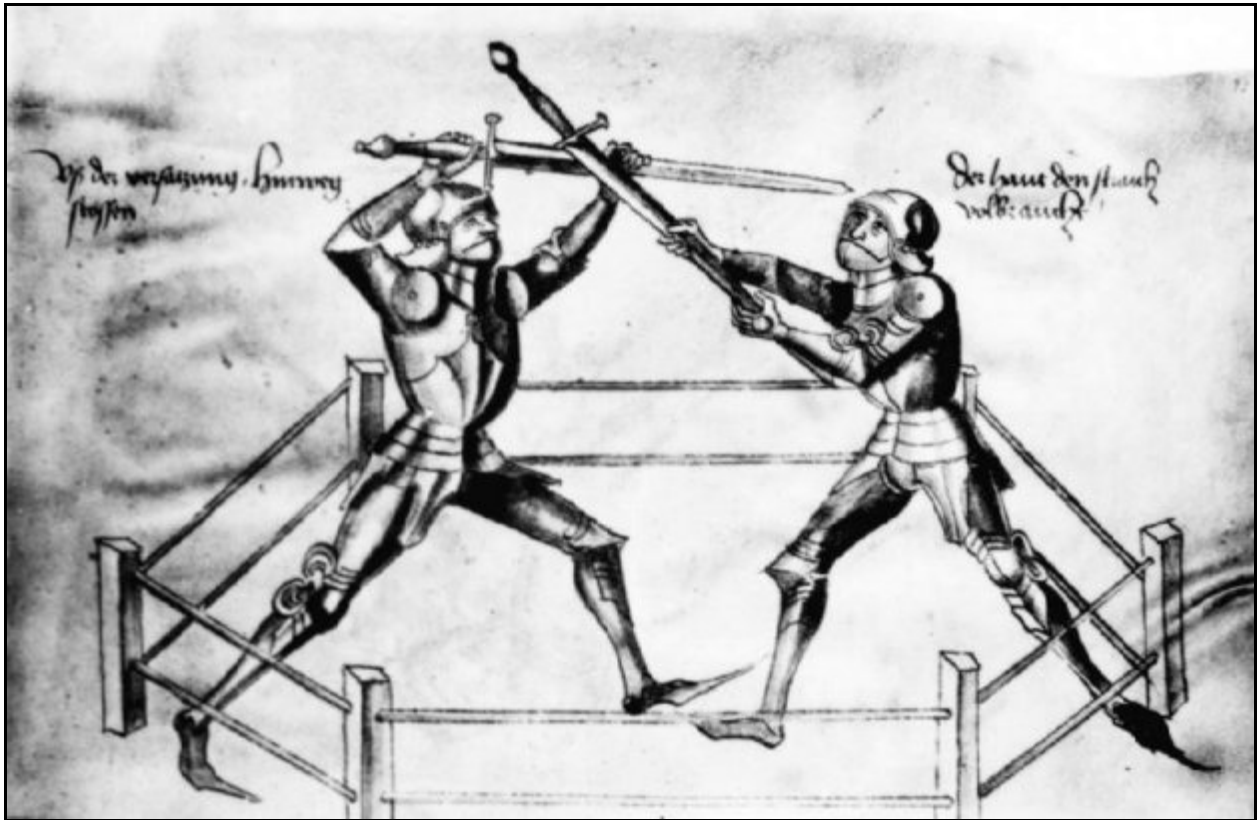
The technique to notice here is the one done by the man at right: Although whether done with long-edge or short-edge is arguable, doubtlessly he swings his longsword low, out to its furthest arc, held only by the pommel, trying to hew through the leg of his foe. Such tremendous torque shocks the tang and handle of the weapon, such that it would survive only if well-built or quality materials. If not, then the wielder is lucky only to get a cracked handle, and quite unlucky if the tang either bends out of shape or breaks completely. Despite correct technique and reasonable targets, I have damaged modern replica swords due to holding them with one of my hands on the pommel during practice-cutting at warranted power, as modern swords tend to be made, quite apparently, to lesser standards.



(26) Ein gewauppert Infal-len und swert niemen

(26) One half-sword assault and sword-taking

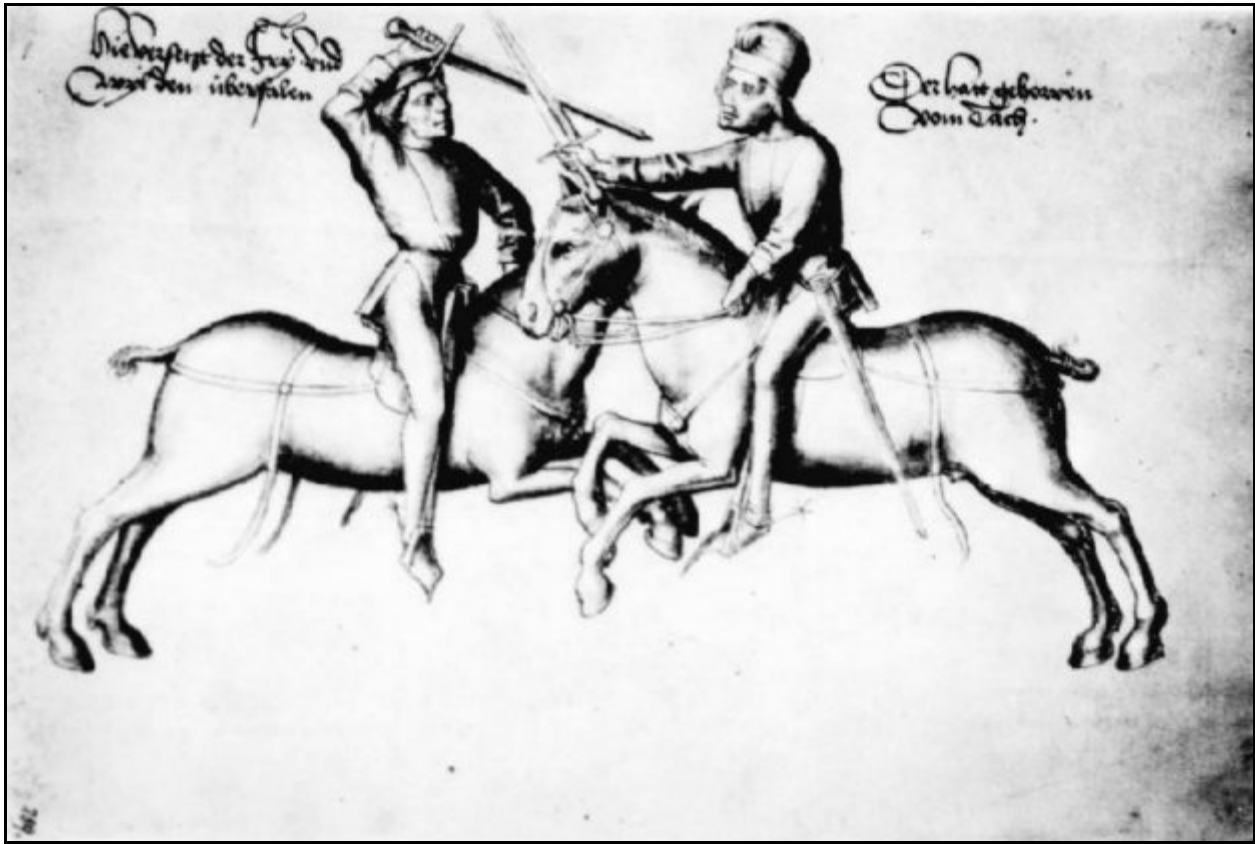
So both fighters were in left plough-wards and the one at left treads forth and wraps the other's longsword, using the leverage of his body and blade to trap his foe's blade to let him twists to successfully take it away. So to achieve this not only requires skill and strength of the wielder, and a decently thick wambeson, yet also a sword that has some stiffness and resiliency to it, and moreover, actually assumes the same of the foe's blade – otherwise, if their blades be overly-flexible, all they get is a ridiculous “dance of the springy-blades”, whereby the fighters turn and struggle while their blades yield to the torques and pressures, instead of transferring the force into cleanly prying the captured weapon out of the hands of the foe.



(73) Uß der versatzung hinweg stossen – Der haut den
straich volbracht

(73) From the forsetting he shoves away – He has fully
made the morte-strike

Pretty much the same, yet somewhat differing in its conclusion, as plate 27 of Talhoffer's 1450-Ambraser seen previously. This redundancy is provided here to reinforce how a given master expected the same functionality from his weaponry over time.



(259) Hie versetzt der Frÿ und Wÿl den überfalen – Der
haut gehowen Vom Tach.

(259) Here he forsets freely and will overtake him – He
has hewn from roof-ward.

So here we see a conflict where each fighter expects certain quality of his respective shortsword or bastard-sword (arguable as to morphology): The rider at left expects his sword to withstand the strike upon its flat by the other, without being bent at the impacted area; and the rider at right expects that his long-edge shall survive being set aside without folding or crimping at its own impacted area; and as well both fighters expect their tangs and handles to endure the skirmish, needless to say. Keep in mind that there are other forces at play in such scenes, like the momentum of the horses adding to the momentum of the fighters as they strike and forset. Indeed, as well remarked by Von Danzig (1452) and as doubtlessly felt in riding, it is to wit that the horse may carry you forward into the foe with power (*dich dein roß mit gewalt fur In trüg*) – which corresponds with remarks by Dom Duarte (1438), wherein he recommended horizontal strikes or diagonal strikes from high (Talhofter shows in this plate) while upon horse, since rider and horse bestly transferred their combined forces into foe through those kinds of strikes.

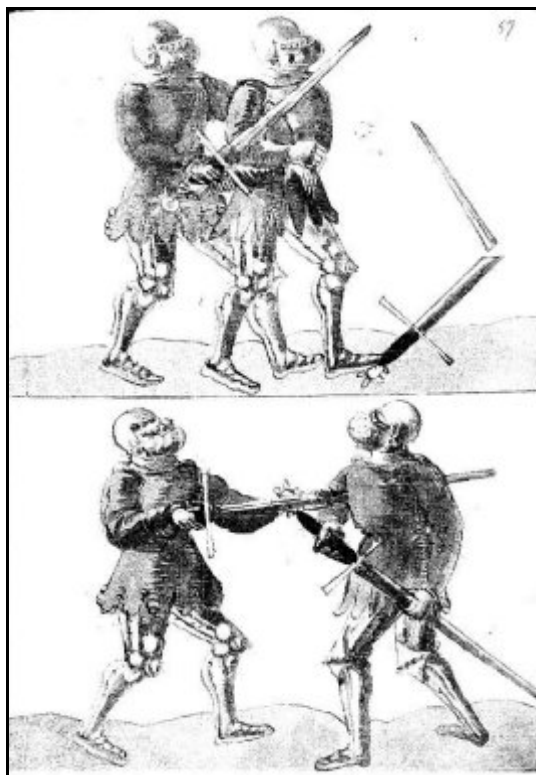
Jörg Wilhalm (1523)

The following images are interesting and informative to this study of weaponry quality and build.

In folio 57r we see that indeed a German longsword, like *any* sword, was not indestructible. That is a universal truth of physics, whether the thing was made in Germany, England, France, Italy, Hungary, or for that matter, Japan or China. So that broken weapon in the upper play of that folio may well have reached material failure while the knights were at *krieg* (struggle), the close-range infighting of crossed-swords, perhaps specifically caused by torsional stress from some sort of levering lock during *ringen am schwert* (wrestling at the sword). That sort of material-stressing struggle is seen in the lower play of that same folio – yet also in the confusing tangle of arms and armour portrayed in folio 68r.

In folio 73r we see portrayed some extreme flexion of blades as the knights wrestle at the sword for control of both weapons – levering, twisting and slipping to try to gain the vantage. Accordingly, in folio 74v we see the dark knight has forsaken that play and goes to grapple. Of consequence to our study, notice the blade with overhanging hilding stays flexed, at the fulcrum of its foible / weak no less, while the other blade does not. Perhaps this merely implies that the dark knight is so speedy that he grapples before that blade has time to straighten itself. But if so, then why has the other blade straightened? Perhaps this indicates something about quality. If so, then it seems to indicate that the one has gotten bent due to poor resiliency while the other went back to straight due to proper resiliency. Yet perhaps this indicates something about build. If so, then it seems to indicate that these longswords, obviously custom-made for the *harnischfechten* nature of *kampffechten*, as evinced by their spiky hilding and the context of this fight, have extra weight in the handle / grip as required to survive particularly hilt-stressing strikes like *mortschlag* (murder-strike) which may be done, among other things, during half-sword (*halbes schwert*) wielding. So aside from the weight of the steely hilding (cross & pommel), did these *kampfschwerter* (dueling swords) perhaps have extra-heavy handles adding substantially to the weight, made not of hardwood or bone and so forth, but instead made of bronze or brass that was custom-cast to fit around the tang? It is hard to say, as the fight-books portrayals only indicate some solid bulk-material, wrapped in cordage or wire and/or leather or chagrin. Although that sort of extra-heavy handle due to all-metal construction is conjectural, it ought to be considered, as it is likely that various artifactual weapons with unique features must have been lost over time, so we cannot negate the idea for sure. Although presently there are few known existent artifactual examples of specialised dueling longswords, we do see those a-plenty in *fechtbücher* like *Codex Wallerstein*, Talhoffer, Vadi and Wilhalm. Such a rare specialised build for sword-handles may have existed, and such build would explain the desired capability to withstand *kurzes schwert* rigors as per Andre Lignitzer.

Anyway, we finish with folios 79v and 83v which both witness to the quality of tempering that was expected of the steel of either the German longsword or dagger. The indicated quality of tempering may have approached, whether differentially (for longsword) or totally (for dagger), the quality of the preeval and coeval tool-steels, as per *Von Dem Herten*. Such toughness was needed by weaponry-points to endure the shocking and prying dealt out by knights trying to breach each other's armour with piercing thrusts either precise or desperate. The possibility of thickened build of dagger-point may be implied as light knight stabs / prys at the hinging of his foe's helm.



(57r)



(68r)



(73r)



(74v)



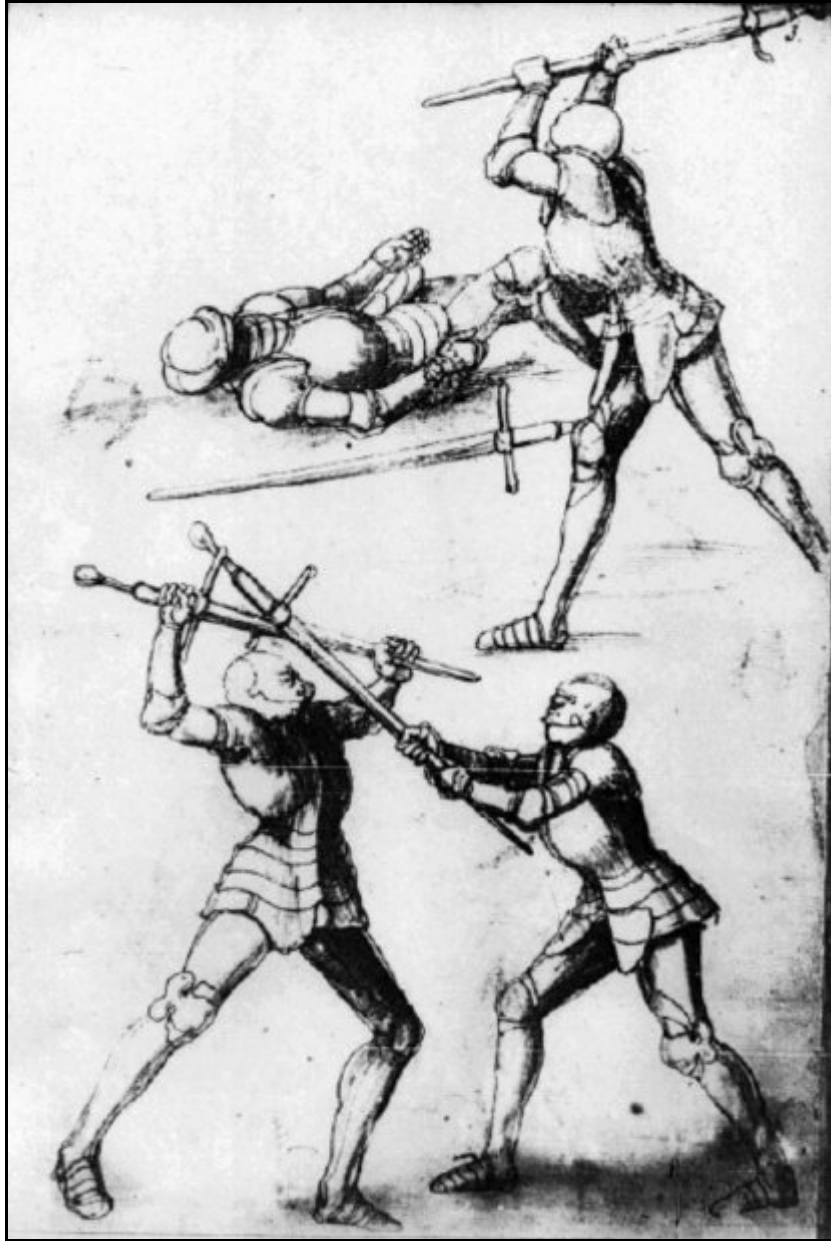
(79v)



(83v)

MS Libr. pict. A. 83 (circa 1525-50)

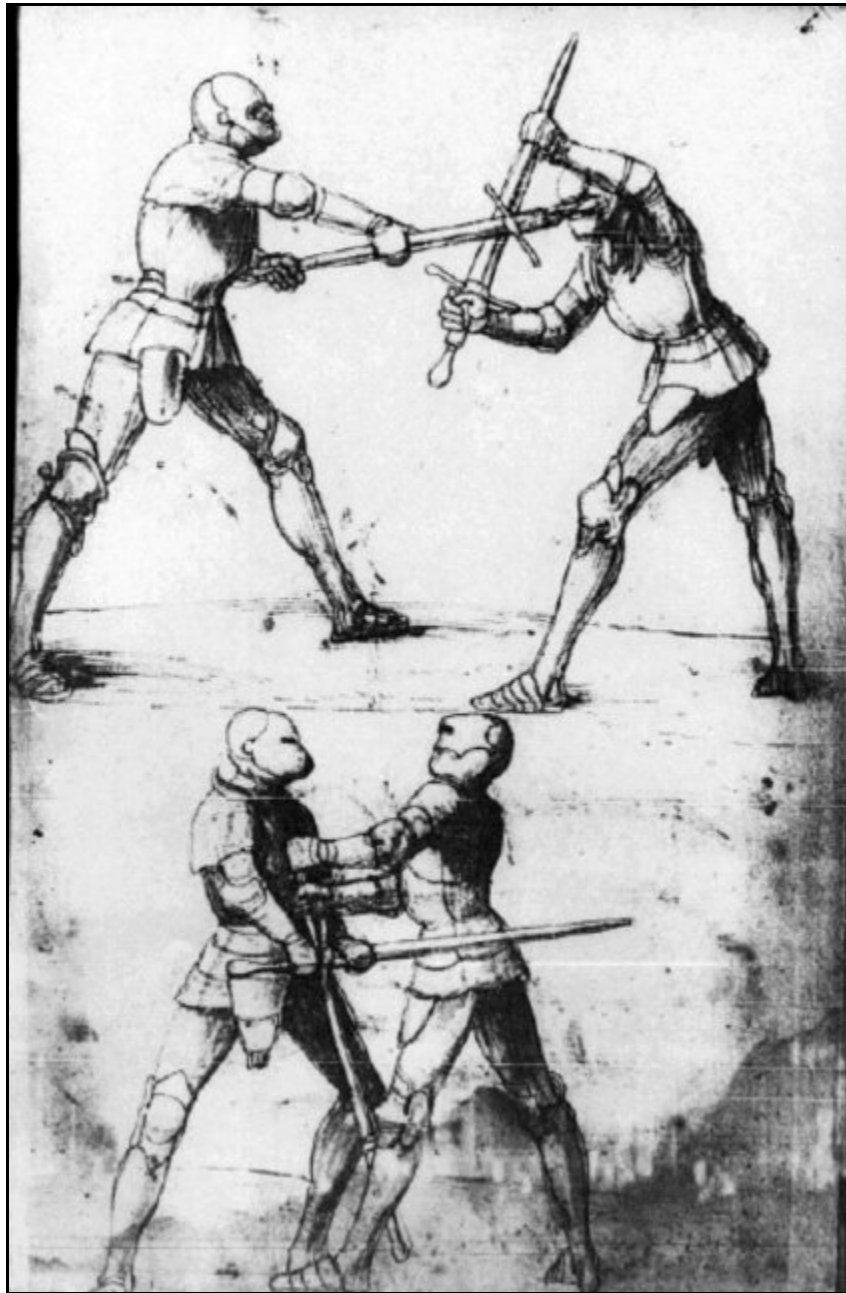
The following imagery comes from an anonymous & virtually textless manuscript of the early 16th Century, yet seems meant to portray both the armoured and unarmoured fencing done somewhat earlier in Germany, during the late 15th Century. These images are quite revealing at times, and a few show things found in no other fight-book.



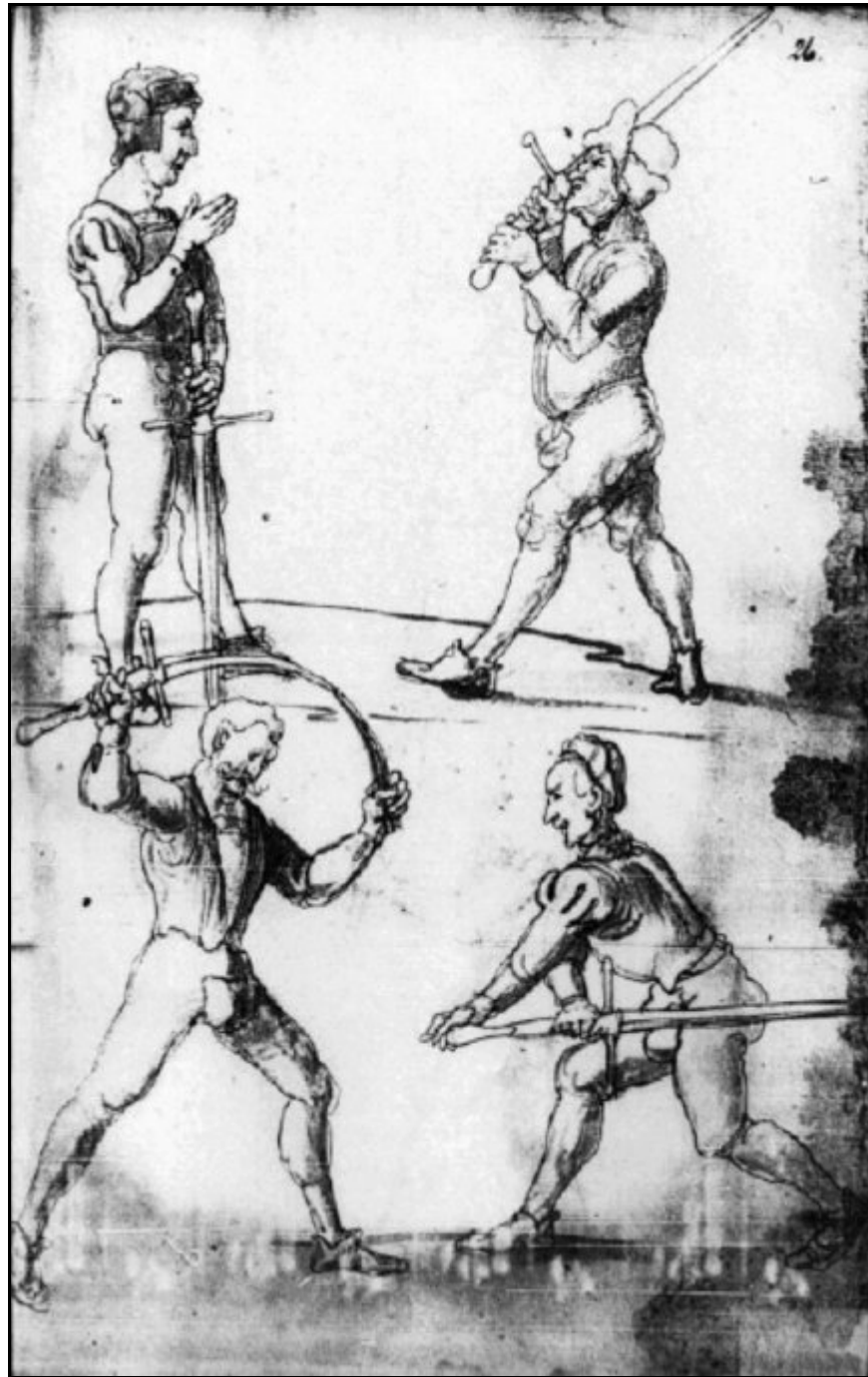
The first folio 3r shows the *coup-de-grace* via *mortschlag* ending some *harnischfechten*, something which must truly put a great deal of stress on the structure of the longsword – a full power morte-strike all the way from overhead and down into the foe upon the ground. Of course in duel, smiting the foe with such a death-blow hardly means one is worried about any further need of a wieldy weapon, as foe shall hardly counterattack thereafter. The second scene is one we have seen before, akin to same shown us by Talhoffer (1450 & 1467), and thus again shows shared concern for functionality of the longsword to endure *mortschlag*, a strike whose momentum tests the sword, whether the hilting actually impacts the target or is halted by the other sword.



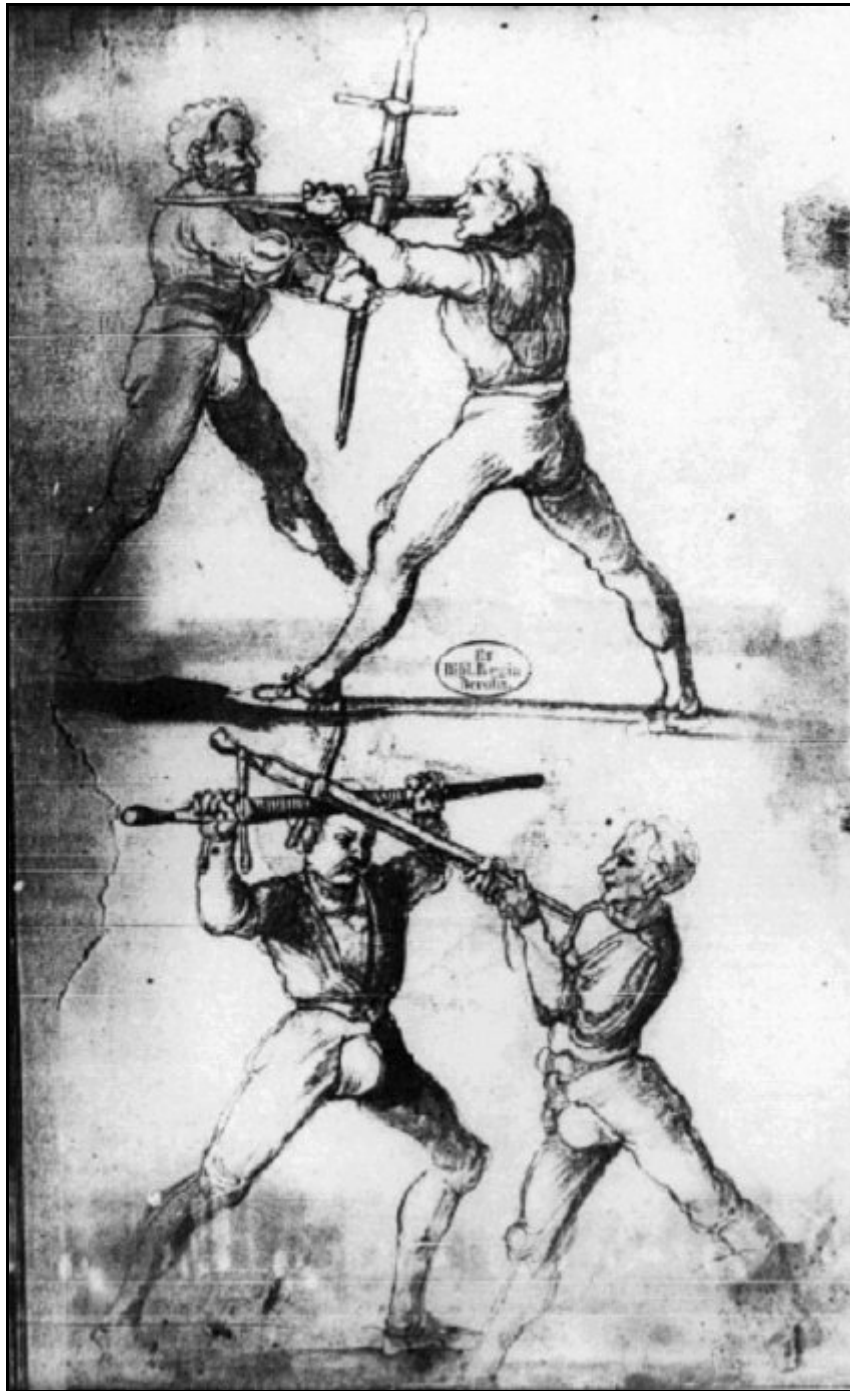
The relevant scene here in this folio 5v is not the first, where one knight readies to throw the other, but the second, where right-knight forsets the *mortschlag* of left-knight by half-swording with his longsword, utilised like a short staff, to intercept the other longsword. Again, the need for proper materials and craftsmanship are witnessed by such a violent scene. Here both the offending and defending blades get the impact at their middles.



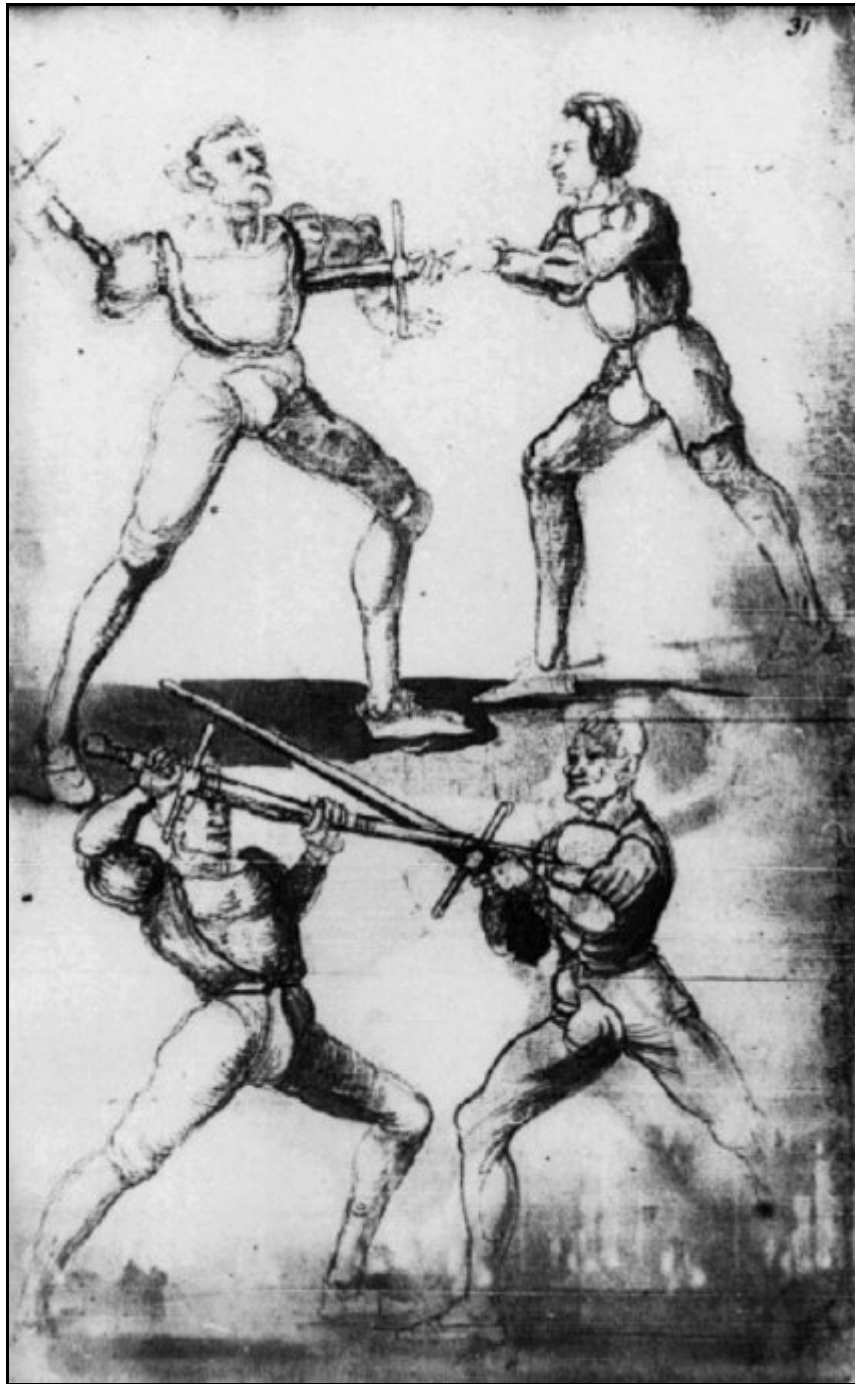
Again, by presenting this folio 6r, please realise that it reinforces by redundancy what was shown in the previous folio 5v – the need for proper materials and craftsmanship are witnessed by such a violent scene. However, this differs in that both the offending and defending blades get the impact at their strongs / fortes. Notice in the second scene that right-knight jams / wedges his longsword through and down between arms, hilt and legs to then use it like a lever to gain vantage versus left-knight by stripping him of his longsword – something indicating a tough weapon that is able to handle an extreme moves.



Okay, this folio 26r may prove controversial, but there it is for all to see and judge for himself: Obviously the first scene is irrelevant to the subjects at hand – but just look at that second scene. As these fighters ready themselves to duel at *bloszfechten*, left-man shows off how extremely resilient be the blade of his longsword (as well as his own strength), while right-man take an awkward posture to fake-out his foe only to thrust with the pommel in half-sword manner (although there are other interpretations for that). Whatever the planned attacks, the display of resiliency, indeed of flexibility, of that sword-blade is obvious. Perhaps the contemporary viewer of the image was given to understand that the blade for unarmoured fencing was meant to be more flexible than that for armoured fencing – however, confirmation is presently lacking. Taking account of perspective, I reckon that the blade is flexed to about 45 to 50 degrees from straight – and assuming it returned to true without a permanent bend, then that is incredible.



In this folio 29v is more of the same – trapping & leveraging, morte-striking and forsetting – which redundantly reinforce previous expectations of high quality and correct build for the German longsword. Notice in second scene how right-man grips his blade so very near its point as he does the *mortschlag*.



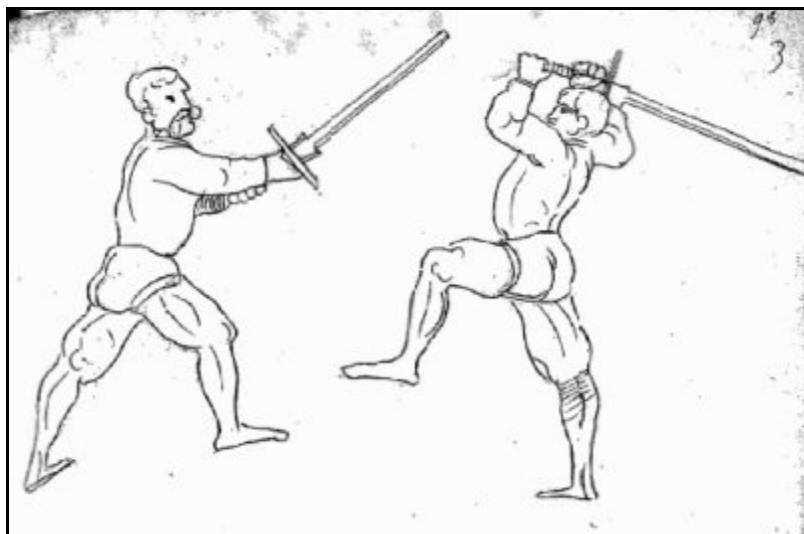
In this folio 31r we see in the first scene again some trapping and leveraging that serves to put lateral and even longitudinal stresses upon a longsword; and in the second scene we see cross & forte displacement to no avail as a half-sword thrust proves the resiliency, indeed the toughness, of the blade as it flexes slightly when its point smites the foe's body.

Paulus Hector Mair (1542) & Jörg Wilhalm (1556)

This is the first of the unarmoured longsword pictures in Mair's *De Arte Athletica*. It shows well the blunt *fechtfeder* (fencing-feathers) of later *federfechten* ("feather-fencing" – thus, civilian fencing) of 16th Century Germany. These had special dagged cruxes before the cross called a *schilt* ("shield"). Similar weapons are also seen in the work *Kunst des Fechtens* (1570) by Joachim Meyer; as well as other fencing manuals. This scene shows wrath-strike from wrath-ward versus crossed-arm thrust from ox-ward. Jörg Wilhalm (1556) shows a *springen-zornhau* similar to the one by Mair, but versus *oberhau*. Again, we ought to consider very forceful strikes like the *zornhau* and the resultant demands upon the quality and build of longswords and other weaponry, whether for civilian or knightly wielding. Unfortunately the past graphic artists, without benefit of modern slow-motion & stop-motion photography, in each picture seem to show the *zornhau* done in false-time (if not also with the wrong leg bent in mid-air) – but that is a tactical subject, thus not our focus here. (Refer to *Force of Zornhau* for Meyer picture of *zornhut* and pictures of *springen-zornhau* from AVI.)



Mair (1542)



Wilhalm (1556)

Louis IX Bible (French – circa 1250)

Okay – these images are not from any *fechtbuch*, yet are included here because the illustrations are quite compelling. We see much earlier texts like the *Louis IX Bible* (circa 1250) portray armoured knights hewing armoured foes at percussion-point about 2/3 to 3/4 of blade-length from cross, even versus helms – something which especially avails as both foes meet in forward motion upon horses. (Such a location for an “optimum” percussion-point probably has as much to do with the actual achievable maximum velocity of a given sword-strike by a human swordsman as with the actual design of the sword – see the previous part *Force of Zornhau* and works in the *Bibliography* entitled *Dynamics of Hand-Held Impact Weapons*; plus *Preparing for the Specific Neuromuscular and Biomechanical Demands of the Javelin Throw*; plus *Slapshot*.) Indeed, as well remarked and as doubtlessly felt in riding, it is to wit that the horse may carry one forward into the foe with power (*dich roß mit gewalt fur In trüg*) as asserted by Peter Von Danzig (1452). This also corresponds with remarks by Dom Duarte (1438), wherein he recommended the equivalent of *mittelhauw* (middle-hew) and *zornhauw* (wrath-hew) upon horse, since rider and horse bestly transferred their combined force into foe through those kinds of strikes. With such great forces at play, a sword had to be tough to survive. The scenes here suggest that breaching strikes into helms while ahorse were possible, indeed no less so than similar depicted afoot in *Lohengrin* (circa 1470), seen hereafter.



***Lohengrin* (circa 1470)**

Again this image is from a literary work – from *romanze* and not from *fechtbuch*: Portrayed with typical literary verisimilitude, knights in harness use non-harness combatives to kill each other, while they also happen to cleave through pretty armour with their fine weaponry. Of course, however accurate the artifactual depiction, the actionary depiction is quite blatantly wrong. The best sword versus plate-armour experiments that I have seen were two done by an accomplished historical fencer: In one he did a full-power edge-strike with a sword while afoot, which put a substantially deep crimp into a post-mounted conical helm, and in the other he did a full-power edge-strike with a longsword while afoot, which put a substantially deep crimp into a post-mounted armet-helm (see *Bibliography* for works entitled *Norman Sword Cuts on Helm*; plus *With a Zornhau strike John C. dents an armet helm...*). But no breaching to a deadly depth, neither as per the previous depictions ahorse in *Louis IX Bible* (circa 1250), nor as per the bloody cleaving of the schaller seen here in *Lohengrin* – although it is remarkable that the blades were of such quality that they proved undamaged by the stress of impacting the helms. One may notice in this scene that, ironically, the man being cut down with *bloszfechten* assaults was apparently making *harnischfechten* ward or attack in correct *halbes schwert* (half-sword) manner. So illustrated *belle lettres* like romances get the stuff pseudo-correct, but not really correct as do illustrated *guerre lettres* like fight-books. It is accurate to assert that manuscriptive illustrations for romances often misportray proper armamentary usage.



A Costly Thing

There is a lot of talk in these our modern times, mostly amid the InterWeb by wealthy modern people, about how swords were supposedly cheap in olden tymes. Well, that was just not true. Even an average-priced sword was a costly thing. People like to talk and talk, but do not bother to actually do the research and the math proving it one way or the other. To remedy that, here are simple calculations proving the great expense, based upon period documentation as surveyed by a modern dissertation, presented here for the reader's perusal and proliferation:

According to *Technology and Military Policy in Medieval England, c.1250-1350*, the subsistence-income for one person in 14th Century England was about 30 shilling 5 pence – thus 360.42 pence (see the *Bibliography*).

The average cost in 14th Century England of full armaments – helmet, hauberk, sword & scabbard, greaves, lance and shield – was about 23 shilling 5 pence – thus 276.42 pence.

The average cost of just the sword in circa 1294-1339 England was 41 pence – mark you, that was forty-one shiny silver pence of the English realm.

Thus a sword equaled 11.38% of annual survival earnings or 14.83% of full kit of armaments cost.

Now let us consider that relative to our own times. The US Census Bureau stated (2007) that the poverty-threshold for a single person under age 65 is US\$10488, and for a single person over age 65 is US\$9669. Let us then use the nice round figure of US\$10000 for a person to live a meager existence nowadays in the USA.

So – when we reckon 11.38% of US\$10000 then we get: US\$1138 = 843 Euros.

Thus, whether 14th Century England or 21st Century America, it seems that a sword was and is a costly thing. What has that to do with weaponry quality? The swordsman then, as now, who pays that much for a sword desires it be worth the high price, hence it must be of high quality. He wielded it with respect and expected much therefrom.



Three Peasants – Albrecht Dürer (1497)

It is hard to say how that one German farmer got hold of a sword evincing design of two or three centuries earlier, for it looks to be an old Type XI. But if he had paid for that thing at the price of prior times, it had cost him dearly.

Reasonable Standards

Yes, here are a couple scenes from that famous Arthurian fantasy film – certainly not any fight-book. Yet if there was actually one somewhat true armamentary thing in that entire ludicrously entertaining movie, it was that nobody back in ye olden tymes honestly expected a sword, even a magical one, to cut through a 1.25 inch diameter bar of steel without shattering, if indeed anybody had such an unreasonable standard in the first place. However, the European knight of the past did have certain reasonable standards for his sword and other weaponry to meet, as the German fight-books give us to understand. And the same goes for the modern martial artist trying to find a decent replica sword, or other weaponry, for his own swordsmanship praxis. Because it is not just everyday that you can get your sword both supplied and repaired by the helpful and beautiful Lady of the Lake.

Excalibur (Britain – 1981)



My pride broke it. My rage broke it!



The Lady of the Lake. Take it. Take it quickly!

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Warning: The combative moves of the fight-books are hazardous, maiming and/or deadly. Any martial arts practice thereof must be done wisely and carefully. Such is always at one's own risk. Be warned !

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