‘We do fynde in our countre great lack of bowes and arrows’

Tudor military archery and the Inventory of King Henry VIII

The Inventory of king Henry VIII[1] is without doubt one of the most extraordinary list of ‘tat and treasure’[2] ever recorded. It was produced on the orders of four commissioners on 14th September 1547 as a source of raw data on Henry`s possession, which would then be used for ‘particular books’. As a record of royal acquisitiveness, it has no equal; jewels, tapestries and the richest of clothes are to be found in profusion. It is a document of interest to the economist, the costumier and of course the toxopholite. Henry VIII was perhaps the greatest royal archer. His personal enthusiasm for archery, his public display to the French King, the legislation which he passed during his reign and his vast purchases of bow staves give him a right to that title. Amidst the 17,810 entries in the Inventory there are many that refer to archery equipment and this short essay is an attempt to analyse a small fraction of the volume of material that has so fortunately been left to us.

Henry’s personal bows are certainly recorded in the Inventory. In Greenwich ‘in the closet over the watersteire’ were to be found ‘a case of yrishe arrowes’[3] and “XXIX bowes’.[4] There were also to be found in the closet ‘a boxe with a byrde of Arrabye’[5] and ‘eight boltes for a turqybowe’[6] as well as numerous large and small items. If this collection is difficult to ascribe to Henry the collection in the ‘studye nexte to the kynges olde Bedde chambre at Westminster’ is far more likely to be his personal archery equipment.

Item 11128	Item iij[7] cases of lether and one of Buckeram conteninge xlij Bowes
Item 11129	Item A Case of grene velvet embrodred over with golde and the kynges armes with one bowe
Item 11130	Item an other case of grene and white veluet with one bowe
Item 11131	Item ij Quivers one of grene velvet embrodred with golde and the kynges armes thother Quiver of grene and white velvet bothe furnished with shaftes

[1] D Starkey ed, *The Inventory of King Henry VIII* Vol I (London, 1998)
[2] D Starkey was the author of this pleasing alliteration.
[3] 9620 All numbers cited here refer to the Inventory enumeration.
[4] 9629
[5] One assumes a painted bird, like many of the items the descriptions are often more intriguing than illuminating. This could perhaps have been a Popinjay target, a gaudily painted “bird” set on a tall pole and shot at by a ring of archers that surrounded its base. I am indebted to Hugh Soar for this suggestion.
[6] 9598 It seems strange to apply the word ‘boltes’ to the arrows of a bow, perhaps they were Turkish flight arrows, short and slim and thereby sharing some of the characteristics of a crossbow bolt.
[7] Wherever I have quoted directly from the Inventory I have kept the roman numerals.

Their sumptuousness and proximity to the king would suggest that this was his personal archery equipment, although whether dusty from long disuse it is impossible to say. By the end of his reign Henry was in no condition to draw a bow, although his retention of them so near his person might, one hope, have been for sentimental reasons.

The Inventory provides us with a glimpse of Henry the toxopholite through his collection of exotic archery equipment, but it also gives a detailed insight into the military archery of the period. Every royal ship with its equipment is carefully enumerated, and unlike the Anthony Roll what appears to be recorded is what was actually present and not a 'paper figure'. In the Anthony Roll the standard issue of one and a half sheaves for each bow is almost universal. [8] The contents of the numerous armouries in Britain and abroad as well as every major and almost all minor fortifications are also recorded in detail and the results are intriguing. The final figures when calculated would suggest that the bow was much more an 'auxiliary' weapon than I would have expected. This is not because of any shortage of bows, but a shortage of arrows.

I have assumed that the Tudor archer was the acme of British military archery. The sheer quantity of military equipment enumerated in the Inventory includes 2,250 pieces of ordnance on land, a magnificent fleet of seventy vessels and 6,500 handguns in the Tower armoury. Henry VIII was not a man who was niggardly in his treatment of his armed forces. In fact the ships of the fleet had embarked 3,441 bows and 5,191 sheaves[9] of livery arrows. On land in the castles, armouries and bulwarks in England, France and Scotland were stored a further 15,072 bows and 50,260 sheaves. This would produce a total of 18,513 bows and 1,330,824 arrows, a not inconsiderable number. Yet what this meant in practice was that there were almost exactly three sheaves of arrows per bow.[10] Many of these bows and arrows were in store and in reality there were usually only between one and two sheaves available for each bow.

Certainly arrow supply had been crucial to victory, at Crecy,[11] Poitiers and Agincourt it has always been assumed that each archer had several sheaves at his disposal to engage in what were sutained battles in which the archer played a pivotal role. In 1359 more than 850,000 arrows were supplied in the Tower with a further 20,000 bows and 50,000 bowstrings. Hardy concludes when considering the provision of ammunition for Henry Vs Agincourt campaign, 'we must grant that enough arrows were available however awkward the cartage involved'.[12] In a sense he must be right, but how many was enough? He writes that

> *If one accepts the idea of 6,000 archers shooting off half a million arrows in one of the rare major engagements,[13] then the production of a million arrows in a year would seem too low a figure, but it should be remembered that, from a million arrows shot off, some proportion would be recovered.[14]*

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[8] See footnotes 31 and 34.
[9] A sheaf of arrows number 24.
[10] 2.995247 to be precise.
[11] Where there were up to sixteen separate attacks recorded on the English line.
[12] Hardy, *Longbow* p86
[13] This would suggest at least eighty three arrows or over three sheaves, with double that number available as a reserve.
[14] Hardy, *Longbow* p84

The figures that are available would suggest a smaller number of arrows than the four sheaves that should, by Hardy's calculation, have been available to the individual archer, for at the battle of Morlaix each archer had only thirty six shafts.[15] Robert Hardy calculates that in an order in 1343 the ratio of shafts to bows was only 25:1, while a further much smaller order in 1346 produced a ratio of approximately 2.33 sheaves to each bow. Whether these orders reflected separate purchases or whether the numbers of shafts and bows ordered were in any way connected is difficult to say. It does however begin to suggest that the English archer was not as plentifully equipped with arrows as we might have thought.

The first major invasion of France by Henry VIII in 1513 saw him take one spare bow and two sheaves of arrows for each archer, a very modest allocation of resources.[16] In the 1545 French campaign the magnificently equipped force had in the ordnance train accompanying the forewarde 3,000 bows and 6000 sheaves of arrows.[17] One must assume that these were a strategic reserve, with the bows and arrows were stored in chests and the strings in barrels. Of the total strength of 9,978 for the forewarde, approximately a third would have been archers.[18] Thus each archer would have a bow and two sheaves in reserve a similar number to that provided in 1513, less than half the number suggested by Hardy during the 'heyday' of archery.

The archer would have been expected to muster with a bow and arrows. In the 1558 rates for armour,[19] which itemises the weapons and equipment that the militia were required to provide, each bow is provided with only one sheaf of arrows. It seems safe to assume that ten years earlier no more would have been expected. Altogether, with this would provide the archer with a total of only three sheaves or seventy-two arrows.

The figures for sheaves readily available to garrisons in castles and bulwarks are considerably less generous than even this paltry load. If we consider the fifty four smaller places of defence which boasted from 176 (Bulloigne-Base) to two (Blacke Bulworke) bows, then only five had more than four sheaves per bow and that the average overall was two with Sandowne only having two arrows per bow! Clearly some like Sandowne or Eymowth which had six sheaves of arrows but no bows, were unusual, but the majority of defensive positions facing foreign invasion were poorly provided for. Four of the smaller French fortifications, which it might have been expected would have been fully provisioned for war, were particularly poorly provided for.

Table 1

	Bows	Sheaves	Ratio
Lower Town of Boulogne[20]	176	266	1.51
Newnham Bridge[21]	40	60	1.50

[15] R Hardy, *Longbow* (Sparkford, 1995), p.59
[16] Hardy, *Longbow* p86
[17] *Calendar of State Papers Foreign and Domestic 1544* 272
[18] A figure based on contemporary military practice as described by Thomas Audley and from the figures given for the Privy Chamber Retinues for the Boulogne campaign (32.39%). *Calendar of State papers Foreign and Domestic* , 1544. 275.
[19] Implemented by the Marian militia reforms of 1557.
[20] I have modernised the spellings contained within the Inventory.

Guisnes town	87	126	1.45
Guisnes Castle	12	12	1.00

There were clearly a number of major munitions depots containing massive stocks of equipment of all kinds. The Tower of London was the armoury of the realm, and the numbers of arrows held there in 1547 are similar to those found there in 1523[22] and in Elizabeth's reign.[23] Naval artillery was disembarked at the Tower and one could assume that naval archery equipment would also be stored there. The significance of the geographical position of the stores of bows and sheaves of arrows reflected the military priorities of the time. The defence of Calais and the newly captured Boulogne ranked high, while the war with Scotland also created the need for a considerable stockpile of weapons. Carisbrooke castle was the storehouse for the Isle of Wight, which had seen, and defeated, the only major invasion force[24] in the 1545 naval engagement.[25] Portsmouth was clearly both a major target for French attack and the base for the fleet. Hurst Castle and Pontefract were clearly stores for arrows but not on the scale of the other centres. The ratio of sheaves to bows in France was slightly less than 3:1. In the North of England, it was almost 4.42:1, while in the South it was only 2.7:1. Overall, the ratio is 3.4:1. Certainly, the North of England was better supplied than France was, but the numbers of shafts in the principal magazines of the realm appear scandalously low.

Table 2
Major stores of archery equipment

Name	Bows	Sheaves	Ratio
Towre of London	3060	13050	4.26
Calice Castell	1500	4720	3.15
Bulloigne-Towne	900	2500	2.78
Guysnes (armoury)	450	1,138	2.53
Portesmouth-Towne	1296	2970	2.29
Carysbrooke	1008	2655	2.63
Hurst Castell	24	1620	67.50
Pountfrait castell	1	535[26]	535.00
Carleslie-Towne	200	2000	10.00

[21] These three formed part of the outlying defences of Calais and were therefore at the very front of the front line.
[22] In 1523 there appear to have been over 16,000 sheaves of livery arrows and 4,000 sheaves of arrows of 9" fletched arrows in the Tower (480,000 in total), while at the end of Elizabeth's reign there were still 393,000 arrows (14,125 sheaves) held there. These figures are provided in the article on Archery by John Waller in ed. V Fiorato, A Boylston, C Knusel, *Blood red Roses- The archaeology of a mass grave from the Battle of Towton AD 1461* (Oxford, 2000), p. 134
[23] This would suggest that the Tower had not been denuded of archery stores, and that we can see a normal pattern of storage and distribution.
[24] The French commander was finished off with a bill blow to the head but after being disabled by arrows.
[25] During which of course the Mary Rose was lost
[26] Arrows with and without heads.

Newcastell uppon Tyne	2000	5000	2.50
Berwicke within the storhous	380	4480	11.79
Berwicke- in the Nesse	400	2700	6.75

The figures for the Kinges Shippes are similarly discouraging. If there had been a shortage in a castle or bulwark, individual requirements could be made up for by issues from the regional armouries. At sea, this would have been impossible and they would have fought with what they had brought. It is true to say that the war at sea would have been fought differently from the war on land,[27] with the archers shooting at targets of opportunity rather than organised volleys,[28] but if anything the fighting would have been more sustained not less.[29] In addition, the numbers of weapons carried reflected the intention of ships to provide sizeable landing forces. It would be difficult to conclude that the provision of arrows need not be so high on sea as on land. The total ratio of sheaves to bows was only 1.5:1.[30] For some of the ships it was far less.

Table 3

Ship[31]	Bows	Sheaves	ratio
The bulle	56	1	0.0
The Gennet	64	50	0.8
The sallomander	160	130	0.8
The harte	160	150	0.9
The hoie bark	9	9	1.0
The Flowerdeluice	4	4	1.0
The porculleis	4	4	1.0
The Shallop Rouager	4	4	1.0
The Spruce of Danske	130	140	1.1
The marye of hanbrough	130	140	1.1
The hare	12	13	1.1
The Swallowe	86	100	1.2
The Jesus of lubeck	170	200	1.2
The lesse barke	120	150	1.3
The Tygar	80	100	1.3
The Dragon	60	80	1.3

[27] There was a gradual transition from tactics based upon close quarters engagement and boarding to one where longer-range firepower would play a greater part. D M Loades, *The Tudor Navy*, (Aldershot 1992) pp96-7

[28] In a similar role to that performed by musketry in later centuries, clearing the fighting tops of marksm,en and the deck of officers and crew prior to boarding.

[29] Witness the Armada campaign, although then as I this period friendly ports would have been available for revictualling.

[30] The number allocated in the Anthony roll

[31] The list of vessels with their complement collected In *Chardge of Thofficers of Thadmyraltie* (10.1.1547) does not correspond completely with that of the lists of *Ordnaunce and Municion* made at the same date. The *spanyshe shallop* appearing in the former but not the latter, while several of the list of Ordnaunce do not appear in the former. In addition, many of the names are spelled differently. Identification is made possible by similarities in the name, position in relation to other vessels on the lists and a general indication of their relative size.

Quite clearly some of the figures are anomalous and reflect recent destoring. If we study the largest and most prestigious ships, those that might be expected to be fully equipped, the figures are still fairly unimpressive.

Table 4

Names[32]	**Bows**	***Bows***[33]	**Arrows**[34]	**Ratio**	**Tonnage**
Henry Grace a dewe	110	*500*	180	1.6	1000
The Jesus of lubeck	170	*100*	200	1.2	700
The mathewe henry	215	*200*	300	1.4	600
The Peter	259	*200*	613	2.4	600
the moren of Danske	66	*150*	120	1.8	500
The greate barke	200	*150*	400	2.0	500
The Spruce of Danske	130	*100*	140	1.1	450
Thane Gallante	100	*140*	150	1.5	450
Grante maistres	83	*150*	150	1.8	450
The Pawnces	180	*200*	350	1.9	450
The marye of hanbrough	130	*120*	140	1.1	400
The lesse barke	120	*150*	150	1.3	400
The Christofer of Danske	92	*200*	150	1.6	400

These figures are the actual totals, which were reported by the ships. It is known that *Henry Grace a dewe* had unshipped some of her major pieces of ordnance to the Tower at this time, and considering the anomalous shortage of bows probably some of her archery equipment was landed at this time as well. The average ratio is still only 1.64 sheaves to bows and only four ships over 80 tons had a ratio of two or greater.[35]

It would be useful to compare arrow stocks with the provision of artillery ammunition. This does not appear generous, varying from about ten rounds for the heaviest pieces to twenty or thirty rounds for the lighter. This would still be enough for a day's steady firing at the contemporary and conservative rates[36]. The Royal ships were not part of a 'blue water' navy, they were expected to operate as a tactical force, often supporting land operations, as they did so successfully at the battle of Pinkie (1547). If artillery provision was ungenerous, that for arrows appears especially niggardly.

The question of who the archers actually were on a ship is well worth considering, were they *souldiours* or *maryiners*? In addition does the presence of one bow indicate one archer or would another bow be kept in reserve, as is

[32] I have used the spelling and the capitalization found in the *Chardge of Thofficers of Thadmyraltie* found in the Inventory

[33] These are the figures for bows contained in the Anthony Roll. These figures would suggest considerable difference between theory and practice.

[34] In sheaves.

[35] It is interesting to note that the Inventory of Royal ships the average number of sheaves to bows was 3.4, more than double that to be found in 1547. Knighton, Anthony *Roll*, pp107-158

[36] Designed for safety, ensuring adequate cooling time between rounds. Much contemporary artillery practice, gun founding, gun design and powder preparation were designed to avoid cataclysmic failures which could and did take place. The daily rate of fire of the batteries besieging Boulogne is roughly commensurate with this naval provision. For further contemporary practice see *Calendar of State papers Foreign and Domestic*, 1544. 1034.

apparent in the case of the field army? Was the bow considered the primary or the secondary weapon? With many bows but few arrows are we considering the weapon of a specialist or a weapon that many, if not the majority might be called upon to use, and then once used discard? There were always more weapons than were needed for their full complement. There were anomalies, for example the *Christofer of Danske* was clearly under provided with weapons, while the *The mathewe henry* was grossly over provided, no doubt as part of its role as a floating arsenal for amphibious assaults.

Table 5

Names	**Soldiers**	**Sailors**	**Crew**	**Bows**	**Weapons** **	**Weapons/ crew**
The Peter	185	185	**370**	259	**579**	1.6
The Spruce of Danske	140	96	**236**	130	**701**	3.0
The mathewe henry	138	138	**276**	215	**715**	2.6
The greate barke	138	138	**276**	200	**520**	1.9
The Pawnces	136	140	**276**	180	**440**	1.6
*The marye of hanbrough**	119	111	**230**	130	**702**	3.1
The Christofer of Danske	119	111	**230**	92	**264**	1.1
The Jesus of lubeck	118	143	**261**	170	**390**	1.5
The lesse barke	105	122	**227**	120	**300**	1.3
The Swepestake	100	109	**209**	138	**336**	1.6

** Weapons include bills, pikes and hand guns, it does not include swords and daggers, which were the property of their owners.
*on active service in Scotland

The ratio of bows to sailors and bows to soldiers is the same at 1.3:1, which would suggest that there was no particular preference for or against this weapon by either group. The overall ratio of weapons of all sorts to crew is 1.9:1 and even without bows it remains at over 1.4:1, which would suggest that no-one need rely on the bow as their primary weapon[37]. The pitifully small number of firearms may indicate their reliance on the bow, but might also reflect the multitude of small swivel guns and other anti-personnel weapons with which the ships were plentifully supplied.[38] Did this therefore make the bow a secondary weapon at sea and the primary weapon of the landing party? From these figures it is impossible to guess, but the simple statement that 'bows aboard ships were carried by archers' (specialist soldiers) seems increasingly unlikely.

I would suggest that the bow was 'issued' on both sea and land with between 36 and 48 arrows at most. In the field army the archer would have one sheaf with him and two more held in reserve. This seems to deny the use of the bow as a 'machine gun', providing the blanket fire in depth necessary to sweep the ground ahead. Even as a skirmishing weapon it would seem to be deficient in

[37] It is intriguing to note that in the retinue of the Earl of Arundel on the 1544 expedition a distinction is made between "mean" and ""principal" archers and billmen. This might have been based on competence, equipment or role to be performed, or more likely all three. *Calendar of State papers Foreign and Domestic*, 1544.273.
[38] Although it is difficult to be precise as the calibre of Tudor artillery, The Pawnces was equipped with thirty one large calibre pieces of 3" and above, and fifty one smaller guns.

ammunition.[39] There was no shortage of arrows for the bows likely to be employed in the front line, but they were not apparently issued. Any good bow would be serviceable for hundreds if not thousands of shots,[40] why then issue an expensive[41] weapon with such a limited ammunition supply? It is as if Wellington's infantry had gone to Waterloo with twelve cartridges for their Brown Bess muskets[42] or if the BEF had gone to France in 1914 with sixty rounds of .303 ammunition for their Lee Enfields. It is inconceivable that the primary missile weapon of the army, the bow, should have gone to war with so few arrows, enough for approximately five minutes constant shooting[43] and yet they appear to have done so. The conclusion seems to be that rather than prolonged bombardment the expectation was that there would be fierce firefights where volume of fire in the initial engagement was more important than the ability to maintain sustained fire.

This theory would appear to contradict the contention that the archer was a 'specialist', the product of long and harsh training who had an elite role to fulfil, and for which he was well paid and respected.[44] This certainly seems to have been the case for the late medieval archer, much sought after by Charles the Bold of Burgundy, while Scottish archers traditionally provided the bodyguard of the French King. Were the Tudor archers men of the same mettle? The skeletal evidence from the battle of Towton (1461) and the wreck of the Mary Rose (1545)[45] would suggest that the archers are readily identifiable by virtue of unique skeletal deformation due to their prolonged practice at the butts. The archaeological evidence suggests that there certainly were 'professional' archers, however there must have been many more men who could have shot bows of over 100lbs draw weight.[46] In an earlier article[47] I have argued that it was not the decline of the English archer but the ignorance of their commanders which led to their under or unemployment. There was certainly no shortage of archers during the reign of Henry VIII, but they now sorely missed the commitment of a commander devoted to their best employment.

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[39] In a five minute skirmish at Headingham I shot nearly a sheaf of arrows in what I considered desultory fire at dispersed targets.

[40] The quality of the Mary Rose bows is a testimony to the availability of first rate timber and highly skilled bowyers. A good yew bow will shoot well for years if well cared for. The Mary Rose bows were not beautifully finished, but they were highly serviceable tools, shot and cared for by men brought up in the bow.

[41] In the 1542 legislation the price of a child's bow (8-14years) was set at between 6d and 12d. The price of a yew bow was set at 3s4d, although it is not known how far theses laws were honoured in the breach or the observance. In 1566 best foreign yew bows were priced at 6s8d, and English at 2s, Henry imported his yew bow staves and their quality appears to have been excellent. Even allowing for inflation a good yew bow would have cost several shillings at a time when a soldier's pay was 6d a day. In 1461 the Duke of Norfolk paid three shilling per bow and a penny for five points. Fiorato, *Blood Red Roses.* p.135

[42] Wellington insisted on each man carrying 60 ball cartridges.

[43] The rate at which a longbow can be shot is a matter of some debate. I can loose 18 arrows a minute from a light bow (40lbs.), 12 from a heavier bow (80lbs.). Simon Stanley shooting a war bow of 130lbs. considers eight arrows a minute a reasonable rate.

[44] A view with which I still have much sympathy.

[45] Fiorato, *Blood Red Roses.* pp108-112.

[46] The legal requirements for practice would demand this, and my own experience is that heavy bows require technique and practice not just brute strength (see also footnote 70).

[47] J P Davies, *The decline of the longbow in Elizabethan England.* Journal of the Society Army Historical Research, 2002

There are very few descriptions of English archers in action, which would give an insight into their use. In the battle of the Spurs (1513), a force of mounted archers deployed behind hedges, to inflict a painful arrow shower on a formation of mounted men-at-arms. In the same campaign, on the 27th June (1513), a convoy of wagons from Guines to Ardres was surprised by a French ambush and destroyed, but noticeably not until the archers had run out of shafts. In 1523 a group of English irregulars or *Crakers* was ambushed after a successful raiding foray and massacred, but only again after running out of arrows.[48] In the self congratulatory pages of the *Commentaries* of Blaise de Monluc he records the English use of the bow as a skirmishing weapon, advancing at a trot halting ten or twelve paces before their target and loosing a cloud of arrows, before smartly retiring. Monluc attributes this tactic initially to English bravery and also to the bow which was of 'little reach and therefore were necessitated to come up close to us to loose their arrows, which otherwise would do no execution'.[49] It is worth noting that during the failed camisade of Boulogne, an event which dented his professional pride not a little, he received three arrows in his target (a shield of wood covered with leather) and one through a sleeve of mail on his right arm.

The opportunities for a 'traditional battle' were almost completely absent, but clearly in the engagements described above no great number of arrows were needed, or stocks were readily used up, implying limited ammunition or poor fire discipline. At Flodden (1513) the conditions were certainly different, and archery was at least partly responsible for the death of the King[50] and certainly responsible for the slaughter and rout of the unarmoured highlanders. The stained glass window in St Leonard's church (in Middleton in Cheshire) records the images of the Flodden archers from that parish, and shows them each with a single sheaf of arrows in their belt.[51] At Pinkie (1547) the archers played a part in the destruction of the confused Scottish pike blocks, but then no detailed account of their contribution is available. What is most lacking is incontrovertible evidence that English archers were issued with or expended a large number of arrows.

The simplest explanation for the apparent shortage of arrows would be that they had already been expended. The successful siege of Boulogne would certainly have used a large number. The Cowdray House engravings of the campaign clearly show archers in the open shooting at the defences, and archers are also shown in the trench system. In addition warfare against the Scots and even the loss of 400 sheaves aboard the Mary Rose[52] would subtract from the total. On the other hand, probably 18,000 sheaves accompanied the army as a

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[48] 'Alas, the while for while the Englyshmen had arrowes to shote, they were no tbroken'. Edward Hall, *The Triumphant Reigne of Kyng Henry the VIII*, vol. 2 (London, 1904), p.17. Quoted in Gervase Phillips, The *Anglo-Scots Wars*, (Woodbridge, 1999) p. 51.

[49] Blaise de Monluc, *The Valois-Hapsburg Wars and the French Wars of Religion* (London, 1971), p. 129

[50] His dead body was found to have at least one serious arrow wound to the face.

[51] Which tallies with the traditional saying that "Every English archer beareth under his girdle twnty-four Scots" Quoted in A E Hodgkin, *The Archer's Craft*. London 1951. Ascham in Toxophilus recorded that "The Scottes themselves… gyve the whole prayse of shotynge honestlye to Englysshe men, saying thus: that every Englysshe archer beareth under his girdle xxiiij Scottes"

[52] The Anthony Roll records that she carried 250 bows, 6 six gross of bowstrings and 400 sheaves of arrows. Despite her sinking on the 19th July 1545 her posthumous portrait was included in this magnificent record of Henry's Navy. Ed C S Knighton and D M Loades, *The Anthony Roll* (Aldershot, 2000), pp42-3

reserve (9,000 would probably have been carried by the archers themselves). 648,000 arrows should have been enough for what was a prolonged but not very extensive conflict.[53]

If arrows were not present in the armouries could they be quickly manufactured? In only two instances have I found evidence that the component parts of an arrow were ready for rapid assembly and that was at Calais or *Calice* and Pontefract.

Table 6

Calice- Longe Bowe Chambre and Crossbowe Chambre

5047	Arrowes reddy Fetherde	iiiiM vjC sheif
5048	Arrowes reddy Fethered and cased	lx sheif
5049	**Arrowes unfethered**	**lxvj shief**
5050	Arrwe cases of red lether with girdells	CC
5051	Hedes for lyvery arrowes	MM
5097	Longe bowes of alle sortes	MD
5109	Glewe for bowes and arrowes	xij lb
5132	Bowstringes most of them decaied	xiiij br

The Calais figures are important because they list something other than complete arrows, itemising unfeathered shafts and arrow points. It also has finished arrows ready in cases (quivers), and it contains the only references to a quantity of arrow cases (presumably for issue). The Cowdray house engraving also illustrates the use of quivers by archers, but Calais is the only armoury to store them and then only 200. The quantity of "incomplete" arrows is still very small compared to the total numbers that were in store, they do not represent a substantial addition to the total. There is a single reference to 'oone wayne loode' of 'Tymbre for arrowes[54]'at Pontefract castle, as well as a eighty five sheaves of livery arrows without heads.[55] Pontefract has the peculiar distinction of having 535 sheaves of arrows and wood to make more, but only one bow![56] Civilian bowyers and fletchers were contracted to manufacture bows and arrows, but it is probably impossible now to calculate how much they could produce in times of crisis.[57]

[53] One might assume that those arrows not shot at the French during the campaign were returned to store in England or more likely France. This would make the paucity of arrow stocks even more apparent. In 1533 William Temple, the King's Fletcher was paid 9d a sheaf for "new making, new feathering, new heading and new trimming 500 sheaves of old arrows which came form the wars when the duke of Suffolk was captain general in France" [1523], while he was paid double that for each of 310 sheaves he had new made, quoted from Harold A. Dillon. *Arms and armour at Westminster, the Tower and Greenwich, 1547*, Archaeologia, Vol. 51 (1888), p 233.

[54] 6223

[55] 6222

[56] 6224

[57] The only bowyer of my acquaintance who makes 'medieval' arrows considers that if he makes a dozen shafts in a day it has been a good day's work. Hector Cole a very skilful arrowsmith considers that he could make thirty five Type 16 points a day. This would produce a total of well over 10,000 a working year (unpublished essay on the Manufacture of arrowheads in the medieval period). The total stock of arrows could be manufactured by less than 150 arrowsiths working for

Bows and shafts packed closely and often-in damp conditions must have had a very limited storage life.[58] There are numerous references to 'badde' or 'decaied' archery equipment, but this cannot be calculated as a proportion of the total. In some instances, good and bad were lumped together, in other cases more care was taken to discriminate between them.

Table 7

	Bows	Sheaves	Strings
Walmer	54 6 broken	180	48 not good
South Castle	120 olde	390 olde	1 barrel old and nothing worth 1 firkin newer making
Hampes castell	55 (30 nothinge worthe)	100	12 dosein
Harway Bulwark	10 broken	4 decayed	
Nottingham	350 old and nedeth reparacion	16 old and nought	3 barrels very old
Carlisle Castle	93 bowes of eugh nothing worth	196	17 doz
Carlelles-Cittideill	92 bowes of eugh nothing worth	198	12 doz
Warke	24 Bowes good and badde	33 good and badde	
Barwick	40 not able to serve	200	

Those responsible for counting the equipment sometimes distinguished between serviceable and unserviceable but more often not. In some cases stocks were clearly in a poor condition, but what proportion of the total was in good, reasonable or poor condition it is impossible to now calculate.[59]

Crossbows and stonebows appear among Henry`s possessions but rarely as an important military weapon. The only significant stock of crossbows and bolts was to be found in Calais, although a few were to be found in the Tower armoury.

Table 8

The Towre of London

3867	Crossbowes of sondry making with iiij paire of wyndassis being broken	vij en
3868	Racke to bend a crossbow	oone
3869	Crossbowe to shoote stoone	oone

one year. If stocks of points could be relatively quickly manufactured it still does not explain the impoverished ratios of arrows to bows found throughout the military establishment.

[58] In an armoury in Ireland in 1578 after only two years storage most of the bows broke when drawn and strings and arrows had been badly affected by damp. C G Cruickshank, *Elizabeth`s Army* (Oxford, 1966) p. 111

[59] I have therefore included all bows and arrows in my calculations.

3870	Quyver for pricke arrowes for crossbowes	oone

Table 9
Calice- Longe Bowe Chambre and Crossbowe Chambre

5098	Crossbowes called Roddes	iiijxx xviij[60]
5099	Crossbowes called lathes	xii
5100	Wenlasses for them	Cxx
5101	Benders to bende small crosbowes	xiiij
5103	Quarrels hedded and feathered with woode	xxM
5104	Quarrels unhedded and fethered with woode	xxM
5105	Quarrel heddes rotten*	xM
5106	Large browne paper[61]	iij quaire
5107	Browne paper of a smaller volume	xxxiiij quaire

*rusted?

The impressive number of quarrels per crossbow, almost 400 ready to be shot and as components, contrast with the ratio of 36 shafts for each longbow. This might reflect the preferred use of the crossbow as a siege weapon for which it is more suited than the long bow.[62]

There were considerable stocks of ancillary equipment associated with archers that reflected their tactical deployment. Stakes and caltrops[63] were designed to impede the progress of an advancing enemy and break the momentum of an attack. This would enable the full weight of fire of the massed archers to be brought to bear on the advancing host increasing engagement time and therefore the numbers of arrows delivered to their target.[64]

The Archers' stake came to prominence at Agincourt (1415) but by 1547, it was quite a sophisticated item. Richard Rowley provided 5,000 archers` stakes 'ready garnished with head, socket, ring and staple of iron', to Sir William Skevington in 1529.[65] The purpose of the stake was to give the archer security form a cavalry attack. The bill was a poor weapon to defeat cavalry, and the 15-20ft long pike was only slowly coming into service with English forces,[66] and

[60] Four score and eighteen or ninety eight.
[61] The quantity of paper and its specified qualities, allied to its proximity to other crossbow related items might suggest that brown paper was used for fletching quarrels, wood and leather were also used for flights. Conventional feathers were unsuited for use with crossbows as their fletchings fold down and are useless at very high velocities.
[62] The crossbow can be kept cocked waiting for a target of opportunity, it requires less bodily strength and training and could be issued to any combatant, it does not suffer from the "archer's paradox" and can therefore be shot through narrow slits with greater ease than a longbow and can be shot more readily from behind cover.
[63] A third technique was simply the excavation of holes of about a foot deep and a foot in diameter, unfortunately there are no reference to stocks of holes stored in the armouries of the realm.
[64] From observation and personal experience a rate of shooting of eight to ten arrows a minute is a reasonable figure from a war bow, much higher figures of up to twice that rate are possible with a light bow and a skilled archer.
[65] Hardy, *Longbow* p133
[66] It had been the primary weapon of the Swiss for over 75 years, but the English preference for the bill remained until well into Elizabeth's reign. This explains in part Henry's reliance on mercenary or auxiliary forces. Millar argues that this reflected England's military "backwardness" a judgement which ignores the nature of "national" forces of the time and the almost universal reliance on mercenaries by all armies.

then in small numbers. The prescience of Henry V in insisting that his archers cut defensive stakes led in part to the triumph at Agincourt. Later battles in France such as Valmont (1416), Cravant (1423) and Verneuil (1424) and in England as at Blore Heath (1459) also saw their employment where 'they [archers] fixed their stakes in the custom of the English'[67] The simple wooden stakes of Agincourt had given way to a more formidable item which had an iron spike at both ends and a loop through which chains or a rope could be attached. Two stakes carried by each archer and arranged in a chequerboard formation would provide an excellent defence without the need for mercenary landsknecht pikemen. The two major stocks of stakes in Calais and Berwick were on England's front line and indicate that they were still seen as a useful addition to the archer's equipment.

Table 10
Archers' Stakes

Ref No	Site	Description	Number
5029	The Towne of Calice- thordinaunce Howse	Stakes for archers	vijM
5296	The Castell of Calice	Archer staves	iiij xx
6226	Pountfrait Castell	Archare stakes	xiij bondells
6443	The Towne of Berwicke uppon Tweid-In the storehoise uppon the Grenes	Archer stakes	iijM
5431	Hampes Castell	Fylde stakes	CLti

Table 11
Caltrops

Ref No	Site	Description	Number
4976	The Towne of Calice	Smale casting galtropes	MCCC
5052	Calice Thordinaunce house	Letteis galtroppes* worme eaten	iijc iiijxx
5589	Guysnes castell	Galthrops	demy br
5590	Guysnes castell	Galthrops of lathes*	xxti
5713	Towne of Guysnes	Casting Galtrops	M
6062	Base Bulloigne	Galtroppes	oone dibr
6852	Newcastell uppn Tyne	caltops	demy br
6004	High Bulloigne	Lettis galtroppes	CCL
6063	Basse Bulloigne	Lettis galtroppes	L
6155	Boulloigne barghe	Lettis galtroppes	L
6449	The Towne of Berwicke Uppon Tweid	letteis caltroppes	LX
6506	The Towne of Berwicke Uppon Tweid	Caltroppes fo to lie in Foordes	XX

- These were caltrops "shaped like an inverted harrow"[68]it seems reasonable to assume that they were mounted on wooden planks or lathes which could be worm eaten. They would both easier to lay and clear than "small casting caltrops".

[67] J Bradbury, *The Medieval Archer* (Woodbridge, 1998) p.153
[68] Inventory p.457

Caltrops were a star-shaped weapon made up of four spikes[69] designed especially as an anti-cavalry weapon. It is interesting to note how they are stocked almost exclusively in France where the danger from cavalry was the greatest.

Bows, where they are described at all, are referred to as *eugh* (yew) and it seems reasonable to assume that all war bows at this time were of yew a far superior wood to any of the other self-wood[70] bows of the time.[71] There is no material specified for bowstrings, and in the majority of cases, they are not even mentioned. If they were to follow the pattern set by the Mary Rose bows they would be horn nocked,[72] without handles and with a draw weight of 100-140 lbs.[73] In May 1547 Bishop Tunstall reported a shortage of both bows and arrows which he attributed primarily to the actions of a single merchant:

> ....We do fynde in our countre great lack of bowes and arrows, and specially of bowes, whereof there is almost none in the countre of ewe. The cause is... that a merchaunte of Danske hath of late tyme engrossed up and gotten in to his hands alone, the byinge of all bow staves ... which were wont to be brought hyther by diverse merchauntes, and then they were plentye and good cheap, and nowe one man having theim alone, enhaunceth the prices as he lyste.[74]

How far this was hearsay or a serious complaint it is impossible to judge, but there seems to be little shortage of bows and a great shortage of arrows.

If there was a shortage of arrows there seems to be no evidence to suggest that there was a shortage of strings. The numbers of strings per bow provided in the vanward was almost ten strings per bow and five arrows per string. This would suggest either very poor strings or bows kept strung,[75] stretching and weakening the string. In his masterpiece on archery *Toxophilus*, which Ascham dedicated to Henry VIII in 1542, he wrote, 'Now what a string ought to be made on, whether of good hemp, as they do now-a-days, or of flax,[76]or of silk, I leave that to the judgement of the stringers'.[77] Silk was suitable for hunting as it produces an almost silent shot, linen makes a very thick string for a war bow, which would leave a thin hempen string as the most likely type used.

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[69] Which when thrown down always produced one spike facing up supported by the other three.

[70] That is a bow made from a single stave of wood. Ascham considered all Brazil, elm, wychelm and ash as bow woods, but they were "but mean for bows". R Ascham, *Toxophilus* (London, 1985), p. Ash makes a reliable but slow bow, suitable for "pricking" (target shooting), but of little use for war.

[71] In the 1514 inventory there are to be found a surprising number of 'wychelm' and 'elmyn' bows, a minority, which appear to have disappeared in 1547. Almost half of the vessels carried them and they totaled over a quarter of the overall number .Ed C S Knighton and D M Loades, *The Anthony Roll* (Aldershot, 2000), pp107-158

[72] Possibly with the string side-nocked, that is with the groove on horn nock being to the side not the front.

[73] The draw weights of Tudor bows appeared to be ridiculously high, but practice proves that even unfit middle-aged teachers can draw bows up to 125lbs. The minimum practice distance established in 1542 for those of twenty four years and over was 220 yards. This would demand a good bow of at least 120 lbs.

[74] Quoted in Gervase Phillips, The *Anglo-Scots Wars*, (Woodbridge, 1999) p. 81.

[75] Obviously inadvisable when a bow will be weakened as it "takes the string" (that is take on a permanent bend), while a strung bow under considerable internal stress would be far more likely to be damaged accidentally. In the Cowdray House engravings the bows are shown strung, even when the archer is far from any possible military action.

[76] Hemp and linen strings both need to be kept from drying out when in storage.

[77] Ascham, *Toxophilus* , p.102

Table 12

	Bows	Sheaves	Strings	Strings/ Bows	Strings/ Sheaves
Blacke Bulworke	2	10	36	18.0	3.6
South Castell	120	390	1728	14.4	4.4
Calais*	**1500**	**4720**	**18720**	**12.5**	**4.0**
Calice Castell	12	60	144	12.0	2.4
1545 Campaign**	**3000**	**6000**	**28800**	**9.6**	**4.8**
Sandis Foote	50	100	288	5.8	2.9
Quinborough	57	92	300	5.3	3.3
Higham	20	23	100	5.0	4.3
Calshot	60	163	288	4.8	1.8
Carisbrooke	1008	3068	4320	4.3	1.4
Tower of London*	**3060**	**13050**	**11520**	**3.8**	**0.9**
Sandown	48	4	144	3.0	36.0
Lymdens bulworke	19	26	48	2.5	1.8
Arch cliff	30	60	72	2.4	1.2
Dover	320	500	720	2.3	1.4
I of W Yarmouth	140	248	288	2.1	1.2
Under the Castle	18	30	36	2.0	1.2
Hurst Castle	24	1872	36	1.5	0.0
East Tilberry	49	64	60	1.2	0.9
Saint Maws	30	70	36	1.2	0.5
West Tilberry	64	68	60	0.9	0.9
Pendeniss	40	96	36	0.9	0.4
Walmer	54	180	48	0.9	0.3
Portsmouth-Towne*	**1296**	**3432**	**288**	**0.2**	**0.1**
TOTALS	1634	5180	20628	12.6	4.0

*Major armouries

** Figures from the forewarde in the 1545 Boulogne campaign

This evidence seems to suggest that for most defensive purposes a few strings per bow were sufficient, while there seems to be no strong correlation between bows and sheaves.

There is no reference to the types of arrows that may have been used. They are simply referred to as sheaf or livery arrows, and no distinction is made as to length, fletchings or point. The 2000 or more arrows recovered from the Mary Rose were probably representative of the type manufactured: in the majority from poplar[78] with some ash. [79] Poplar has been deemed an inferior wood to ash for as the doyen of Tudor archery Roger Ascham recorded 'Again alder..asp…either for their weakness or lightness make hollow, starting, studding,

[78] Ash was the preferred material for war shafts. I find it remarkably resilient to mishandling on the ground and drifting in the air, it always arrives on the target with a satisfying thud. Ascham in his disquisition on arrows declared "as concerning sheaf arrows for war, (as I suppose) it were better to make them of good ash, and not of asp [poplar] as they be now-a-days. For of all the other woods that ever I proved, ash being big is swiftest, and again heavy to give a great stripe withal, which asp shall not do". Ascham, *Toxophilus* p.120

[79] Margaret Rule, *The Mary Rose*, (London 1984), p176. 180

gadding shafts'.[80] However, recent practical experiment has shown it to be a very suitable material. Using accurate copies of the Mary Rose arrows David Curtis found that the same arrow would match a wide range of bow weights.[81] He summarised its advantages as follows

> *It is a fast growing and easily managed and harvested resource. It is quick an easy to work when compared to, for example, oak or ash. Most importantly though, you can issue the same sheaf of arrows to any archer who can confidently shoot them from a range of bows between 70-120lb draw weight-rather like issuing bullets for a rifle.*[82]

This would suggest that the use of poplar was not a matter of simple economy but practical policy to ensure inter-operability.

The shafts were approximately thirty inches in length with six-inch fletchings[83] glued[84] and tied on. The nocks were shallow and reinforced with slivers of horn.[85] The use of leather spacers on the Mary Rose would suggest the use of a narrow point, perhaps a bodkin point, or a low barbed type sixteen,[86] but certainly no broadheads. There is no evidence to suggest that flight or bodkin points were used,[87] and the only evidence I have been able to collect on the wound inflicted by military arrows imply that they were of the Type sixteen[88] variety and not firmly fixed to the shaft.[89]

What is surprising is the lack of 'fire' arrows that would have been suitable for incendiary, signalling and possibly illuminating purposes. There were quite considerable stocks of incendiary material and specialised workshops for their manufacture. There were substantial quantities of hoops, trunks, pots, pikes,

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[80] Ascham, *Toxophilus* p119

[81] He was suing a variety of bows from 68lbs-115lbs.

[82] D Curtis, *Heavyweight bows and Poplar Arrows*. The Glade No 95. It would be interesting to see if poplar arrows performed equally well on 120-150 lb bows.

[83] Goose feathers would have been the most likely used for fletchings. They were collected en masse from geese in 1417 and 1418, only primary or flight feathers were used. In 1522 feathers were bought by the King's Fletcher for 21d for 1400, quoted from Dillon *Arms and armour*, p 233.

[84] The reference in the Calais armoury to *Glewe for bowes and arrowes*, would suggest that fletching glue was also used to attach the horn nocks and possibly the arrowheads as well. Laminated bows, which consisted of strips of wood glued together, were unknown in England where the self-bow (made from a single stave of wood) predominated.

[85] Deep nocks are suitable for war arrows, which are shot from heavy bows, and where a firm connection is necessary to hold the arrow to the string firmly and avoid breaking the nock. Shallow nocks are more suitable for target shooting, they are looser on the string and more fragile, but make for a quicker and cleaner loose, which is an aid to accuracy.

[86] Ascham refers to the "little barbs" of the narrow diameter heads designed to maximise penetration for " when a man shooteth at his enemy, he desireth rather that it should enter far, than stick fast." Ascham, *Toxophilu*s p. 131

[87] The arrow points in use at this time appear to have been; bullet and small conical points for practice, concoidal with small flat wings, suitable for flight shooting and the diamond pointed head with small barbs of the Type 16 (London Museum medieval catalogue) for general purpose military work. None of these points is ideally suited for armour penetration. Ascham declared "I would wish that the head-makers of England should make their sheaf arrows more harder pointed than they be; for I myself have seen of late such heads set upon sheaf-arrows, as the officers, if they had seen them, would not have been content withal". Ascham, *Toxophilus*, p.132

[88] Using the Museum of London typology.

[89] Davies J P, *Arrow wounds and how to treat them.* Journal of the Society of Archer Antiquaries Vol.41 1997. Davies J P *Type 16 or not Type 16 is this the question?* Some thoughts on Tudor military[89] arrowheads. Journal of the Society of Archer Antiquaries 2002

balls, pickes, lockettes and faggots of wildfire but there is little evidence of substantial numbers of incendiary arrows. There is no reference to 'fire' arrows at Portsmouth, the Tower or on any of the King`s ships,[90] which would seem to preclude their use at sea. Seafarers have a reasonable horror of fire: but perhaps their fear of scoring an 'own goal' was enough to prevent its employment.[91]

Table 13

5535	Guysnes Towne	Wyldfire of John Johnsons making	Fire arrowes	iiij
5577	Guysnes Towne		Sheif arrowes withn wildfire	Liii
5874	Newehaven	Thordennce house	Arrowes with wildfire	iij
6494	Berwicke Towne		Arrowes for fire worke	Cvi

Bows and arrows were stored in chests[92] and strings in barrels. There are numerous references to chests for both, in use and in store. In some instances, chests could clearly used for both purposes whilst elsewhere a distinction is made as to purpose.

Table 14

5202	Calais	Chestes with lockes for bows and arrows	Xv
6450	Berwick	Bowe chestes emptie	XV
6451	Berwick	Arrowe chestes emptie	XXV
6505	Berwick	Chestes for bowes and arrowes	XII
7096	Hume Castle	Cheste of bowes	oone
7097	Hume Castle	Cheste of arrowes	ij

I have had to estimate the number contained in the various receptacles based on a reasonable body of evidence. In the record of the ordnance carried in the vanward of the 1545 expedition .

Bows, 3,000,eight chests to a load, carriages 8
Bowstrynges, 20 barrels 200 gross, carriages 3
Levery arrowes, 6,000 sheaf in 160 chests, carriages 16.

The chests were of a very simple nailed construction[93] and based on these figures they would contain 46.875 bows. I think it is safe to assume that forty eight were carried in each, partly because so many calculations relating to archery

[90] In the 1514 inventory there are several references to incendiary materials, but very few arrow. The Mary Roose [Mary Rose} had a stock of seventy four 'arrowes of wyld fyre and two 'balles of wyldfyre. P142.
[91] If the loss of the Mary Rose to mishandling is distressing, the loss of the French flagship Carraquon on the 6th July 1545 to fire, because of careless cooks in the preparation of a royal banquet, is even more embarrassing.
[92] Anne Boleyn was buried in an elm arrow chest. Its use for this purpose does at least suggest that the chest was fairly deep.
[93] There were only 104 chests of bows referred to in the Inventory, other bows may have been carried in chests, but they are referred to in whole numbers not chestloads.

were made in multiples of a dozen and also because the total of 3,000 represented the nearest round number, (multiplication using Roman numerals is notoriously difficult). In the Mary Rose excavations forty eight bows were found in one chest, thirty six in another[94] but unfortunately, it is not clear from the accounts how full the chests were.

A chest of arrows would contain 37.5 sheaves or exactly 900 arrows, but I am assuming that these would be ready for war service and therefore in spacers. One of the arrow chests on the Mary Rose contained 1248 shafts tied together in exactly fifty two sheaves.[95] A sheaf tied with thin cord was likely to take up less space than one in a leather spacer[96] but this method would have had a deleterious effect on the fletchings over a long period of time.

I have completed the calculations based on fifty two sheaves erring on the side of generosity.[97] A barrel of bowstrings contained ten gross or 1440, this figure is supported by the following evidence.

Table 15

	Strings
Newehaven	2 barrel 20 grosse
South Castell	1 barrel old and nothing worth 1 firkin newer making
Iof W yarmouth	1firkin conteynyng 2 grosse

The barrel described a receptacle that contained a specific volume of liquid (thirty six gallons or 5.76 cubic feet), while the firkin contained one quarter of that or nine gallons. A firkin should therefore contain 2.5 gross of strings, although the only reference here is to two gross. The barrels would probably have been of oak with hazel hoops bound with linen thread. They provided an excellent form of protection and were used for a wide range of dry and wet stores and sometimes had padlocks fitted to them.

I have been unable to find references to bracers.[98] They were certainly used, as numerous illustrations, written records and surviving examples from the Mary Rose attest.[99] I think it is safe to assume that this was considered a personal

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[94] Hardy, *Longbow*. p198

[95] Rule, *Mary Rose*, p 174

[96] The circular spacer was perforated with 24 holes through which the arrows would be thrust. This effectively kept the arrows evenly spaced and avoided crushing their fletchings. The spacer could be incorporated into a linen bag, open at both ends, in which arrows could be protected from the elements but easily drawn and nocked. I have used such a device for several years and find it very serviceable.

[97] There were in total 184 chests of arrows noted in the Inventory. If they contained 900 rather than 1200 arrows the total number of arrows would have been less by 55,200 which is only a little over 4% of the total.

[98] The leather or horn wrist protector that is visible in many contemporary paintings, with several fine examples being found in the Mary Rose. They provide a practical protection from the string, but an experienced archer does not really need one. They were often highly decorated and probably more important as a symbol of the owner's pride in his craft and personal status. There are also no references to shooting gloves, which Ascham considers as common pieces of an archer's equipment.

[99] Mostly of leather but one of horn. The horn bracer only survived by being protected from marine life by being covered by tarred rope. No other substantial items of horn survived. Some bracers carried the badge of Catharine of Aragon (the pomegranate and castle) Henry's first wife who was divorced in 1534 and died in 1536. The survival of these bracers would suggest they had

item to be provided by the individual archer. If individual strings can be mentioned surely they would have recorded the many bracers that would have to be issued. Bracers of a similar pattern, or employing 'royal' decorations, such as some of those found on the Mary Rose,[100] need not be explained by a policy of Government Issue.[101]

The sheer volume of archery equipment in the Inventory is impressive, but there is clearly no effort made to distinguish between types of bow, strings or arrows. For an arrow to be shot safely and accurately it must match the bow and the string.[102] The apparent uniformity of equipment would suggest that a "one size fits all" mentality and policy was in operation, essential if they were to be an issue item.[103]

The army and navy of Henry VIII was clearly still a force that looked to the bow for its missile power, yet the absence of a large stock of arrows would suggest that a short sharp "hailstorm" of arrows was deemed more important than long distance sustained fire, the famous medieval "arrow storm". This tactical employment was reflected in the volume and type of equipment. It might be worth considering whether the archer could be not a member of a military elite but simply the possessor of a skill that was admittedly highly valued but not by any means unique.[104]

Note on the reliability of the figures.

I have little doubt that the numbers of bows and sheaves of arrows is accurate. On occasion, the totals appear in remarkably convenient round numbers (as in the case of Newcastle), but often they were clearly counted carefully, down to the last string e.g.

Table 16

	Bows	Sheaves	Strings
Walmor	54 6 broken	180	48 not good
Blacke Bulworke	2	10	36 olde

The attention that was devoted to the collection and recording of the information, even in the largest of the armouries, would suggest that great care was taken to be accurate. As I have mentioned earlier it is impossible to establish what was the condition of the archery equipment. In some cases it was clearly

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a remarkable longevity or that the craftsman who made them had a serviceable and popular die that he liked using.

[100] Some of the bracers were decorated with the royal arms, the Fleur de Lys, The Tudor Rose and. Rule, *The Mary Rose*, p173

[101] Several of the archers in my company use similar bracers simply because they were bought from the same man.

[102] Longbow archers, if they wish to shoot well, devote much time to the preparation and matching of equipment.

[103] Any archer worth his salt would have spent much time in preparing bow, strings and shafts to ensure optimum performance. Were the professional standards of archers higher or lower than the standards expected from the soldiers of today? Ascham and later Harrison were critical of the attitude of their contemporaries to the art and discipline of archery.

[104] This of course runs contrary to the popular perception of the archer, which is one that I have long shared as it, appeals to my vanity as an archer.

poor, but it is impossible to calculate what the overall figures of serviceable versus unserviceable materiel would be. The figures from the vessels in the fleet also reflect a concern with accuracy, they are clearly not ‘paper’ figures.

I consider that it is reasonable to accept the figures at face value, primarily because the main thesis of this essay, that there were remarkably few arrows per bow is dependent on an analysis of the ratio between those two items rather than on the total numbers.