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THE INTRODUCTION AND DEVELOPMENT OF PLATE ARMOUR IN MEDIEVAL WESTERN EUROPE C. 1250-1350

Abstract: European underwent a period of rapid development and experimentation in the century after c. 1250. Whilst very little physical material has survived from this time, artistic depictions, wills, inventories and contemporary accounts attest to the use of metal plate defences much earlier than has commonly been assumed. By the turn of the 14th century, all the major elements of plate armour had been developed; with the subsequent half century seeing an increase in the quantity of plate worn on the battlefield. However, the development of plate armour was extremely erratic, and did not follow a simple linear progression. The stimuli for its development are still not fully understood. However, improvements to crossbow technology may have had a significant impact.

Keywords: iron plate, baleen, leather, mail, cuir bouilli, crossbow, goat's-foot leaver

From at least the 5th century BC, until the mid-14th century, mail had been the dominant form of metal body armour in use on the battlefield. For much of its early history the wearing of mail was largely restricted to wealthier individuals. Certainly according to Guibert of Nogent in the early 12th century „*Dei gesta per francos*“, mail was associated with the knightly class¹. However, by the mid to late 13th century iconographic and literary sources, such as the 1252 Assize of Arms of Henry III of England, demonstrate that mail was increasingly being worn by lower ranking soldiers². In combination with a padded undergarment, mail provided an effective and robust defence against most types of weapons. For example, during the battle of Brémule in 1119, Henry I of France was struck by a sword blow, but escaped death thanks to the protection offered by his mail coif, „the cap of the noble prince's hauberk protected his head from injury“

(„sed capitium loricae specialis patricii caput illesum protexit“)³ (Fig. 1).

Whilst mail offered good protection against cutting and glancing blows, it could be somewhat less effective against sword and spear thrusts and the penetrating injuries inflicted by missile weapons. It thus became necessary to provide additional protection in the form of rigid plates made either from metal or organic materials such as horn, leather and *cuirbouilli* – boiled rawhide⁴. As early as the mid-12th century the Norman poet Robert Wace, in his *Roman de Rou* (begun c. 1160) refers to a number of soldiers wearing defences of leather (of unknown form) fastened to their breasts „some of them had good cuirasses tied around their stomach“ („Alquanz unt bones coiries, K'il unt a lor ventre lies“)⁵. In 1174 the Welsh chronicler Giraldus Cambrensis in his *Expugnatio hibernica* refers to the Danes wearing long shirts of mail and armour of iron lames („laminis ferreis“), possibly similar to the iron plates found in the early 7th century AD graves at Valsgårde⁶. Probably the most widely known early reference to plate armour is the account by Guillaume le Breton describing the encounter between Richard Count of Poitou and Guillaume de Barres in 1185, in which the lives of the protagonists are spared thanks to an iron plate worn beneath the

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¹ *Erat ergo ibi considerare collectum totius Francorum militiae, nobilitatis, prudentiae armorumque claritudinis florem, quos in equestri loricatorum galeatorumque decore hi, qui exercituum quantitates pensare didicerant, centum circiter milia putavere*, Quoted in: Huygens (eds.) 1996, 147.

² See for example the 1252 Assize of Arms of Henry III of England (Quoted in: Delbrück 1982, 677-678 and the 1303 ordonnance of Philip IV of France which specified *Et seront armés les sergens de pie de pourpoint et de hauberjons*. Quoted in: Hewitt 1967, 197.

³ Chibnall 1978, 238.

⁴ Cheshire 2017, 93-97.

⁵ Quoted in: Buttin 1971, 241.

⁶ Quoted in: Oakeshott 1996, 269 and Richardson 1997, 40.



Fig. 1. Knights depicted in full mail hauberks and chausses c. 1220. From the northern façade of the Cathedral of Notre Dame in Reims. Image reproduced courtesy of Martin Aigner (www.burgenseite.com).

hauberk and aketon⁷. Despite these references, it is only from the mid-13th century that the evidence for plate armour becomes more widespread (see below for further discussion on this point).

Naturally given the inherent risks on the battlefield, the limbs were extremely vulnerable to injury, and were thus one of the first parts of the body to receive plate protection⁸ (Fig. 2).

Both artistic and literary references to plate armour for the legs may be found throughout the second half of the 13th century, though it is not until the end of the century that these become more frequent⁹. Even so, mail continued to be the most common form of leg defence. Early leg defences frequently consisted of simple knee plates buckled around the leg of the wearer or attached to gamboised cuisses. However, by the early 14th century a number of effigies

show more complex construction incorporating multiple pieces¹⁰. Many were probably made of hardened rawhide or cuirbouilli, though metal was not uncommon.

Though less common than poleyns, greaves are also sometimes encountered in artistic depictions from the mid-13th century. Frustratingly it is often impossible to identify the material they are made of, though a number of early references to solid metal greaves including one from the „Monk of St Gall” in the 9th century makes metal a distinct possibility¹¹. As early as 1253 greaves of iron („mustelias ferreas”) were bought for King Edward I of England in Bordeaux¹².

In 1288 Bonvesin de Riva in his *De magnalibus Mediolani* recorded the presence of armourers producing greaves, cuisses and poleyns of hardened polished steel¹³. The will of Odo of Rousillon of 1298, for example, lists

⁷ Quoted in: Hewitt 1967, 119-120: *Utraque per clipeos ad corpora fraxinusibat Gambesumque audax forat et thoraca trilicem Disjicit: ardenti nimium prorumpere tandem Vixobstat ferro fabricate patenarecocto, Qua bene munierat pectus sibi-cautusuterque.* – It should be noted though that there is no consensus as to the form this iron plate took.

⁸ Thordeman 2001, 160-179.

⁹ Downen 2015, 24.

¹⁰ See for example the effigy of Sir John de Thornhill, c. 1322 in the Church of St Michael and All Angels, Thornhill Yorkshire, England.

¹¹ Rengarth 1989, 45.

¹² Moffat 2010, 7.

¹³ Quoted in: Novati 1898, 148-149. A thriving armours community was recorded in Paris in 1313, suggesting it had existed for some time before this date. Buttin 1910, 30.

greaves („meas trumelieres d'acier") alongside a visored helm, a hauberk, aketon and what may either be a mail coif, or plate gorget¹⁴. Consisting of a single gutter-shaped plate, protection was confined to the front of the leg. Yet despite their simple design they remained popular and continued in use for many decades following the introduction of fully enclosing, or hinged, greaves. Evidence for the existence of fully enclosed greaves can be found in both literary and artistic sources from the turn of the 14th century. The detailed inventory of the Constable of France Raoul de Clermont-Nesle, drawn up shortly following his death at the battle of Courtrai in 1302, describes both types of greave: along with „furbished demi-greaves,, („demie greves fourbis") the inventory also lists „enclosed greaves" („grevessontclos")¹⁵ (Fig. 3).

Armour for the feet is not generally thought to have been developed until the very beginning of the 14th century. The armour purchased for the Scottish Earl of Ross in 1302-1303, for instance, lists „a pair of greaves provided with armour for the feet and a pair of poleyns" („Un peyre jamberis ove les wampes e un peyr poleyns")¹⁶. However, a much earlier entry exists in the English Close Rolls of 1253 which lists 'iron greaves with small plates made of iron on top of the foot' („unas mustilerias ferreas cum particula ferrea supra pedem")¹⁷.

Unlike plate defences for the legs, which developed fairly rapidly from the late 13th century, armour for the arms for use on the battlefield appears to have been slower to develop. One possible explanation for this may have been due to the level of protection the shield already provided to the upper body¹⁸. In contrast inventory references to armour specifically for the joust occur throughout the 13th and early 14th centuries and may have influenced the development of some elements of armour on the battlefield, such as that for the arms¹⁹. For example, the mid-13th century „Verses of Henry de Laon" refer to shoulder plates for the tournament²⁰.

For the first few decades of the 14th century the most common arm defence consisted of round metal, cuirbouilli or baleen plates, attached directly to the mail at the elbow and sometimes at the shoulders²¹. Other forms included aketons which incorporated baleen in the sleeves, as in the inventory of the English knight Sir John Fitz Marmaduke in 1311 „one reddish aketon with sleeves of baleen"



Fig. 2. Knight shown wearing gamboused cuisses with reinforcing knee plates. From a column capital at Malbork Castle, 1st half of the 14th century. Author's photograph.



Fig. 3. Fully enclosed greaves with hinges c. 1330. Bodley Douce 366 Ormesby Psalter folio 38r. © The Bodleian Library.

¹⁴ Quoted in: Mann 1922, 147.

¹⁵ Kelly 1905, 468.

¹⁶ National Archives (UK) E.101/11/5 With thanks to Tristan Langlois of the Royal Armouries for his assistance with the translation of this passage.

¹⁷ Lachaud 1998, 357.

¹⁸ Thordeman 2001, 167.

¹⁹ Richardson 1997, 42; Crouch 2006, 190; Moffat et al. 2008, 209, and see Gravett 1993, 62-89.

²⁰ Gravett 1993, 64.

²¹ Downen 2015, 38.

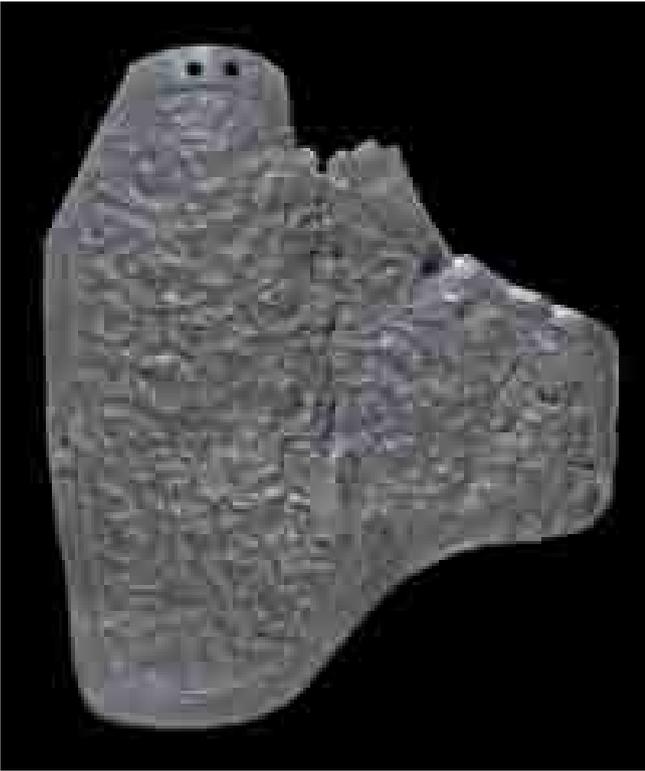


Fig. 4. Tooled leather rerebrace c. 1340. © The British Museum.

(„j aketonrubeum cum manucis de Balayn”)²². Some of the best evidence for the design of early arm defences comes from Italy, where the wearing of decorated cuir-bouilli rerebraces, often en-suit with matching greaves, is frequently depicted on effigies, particularly from c. 1280 onwards. Whilst this may reflect a regional variation seldom associated with armour at this early date, a reference in 1337 to 120 tooled black leather rerebraces in the Tower of London, and „three pairs of rerebraces of leather” („3 paires de bracieres en cuir”) in the 1331 inventory of Hugh de Caumont, demonstrates they were not only worn in Italy²³. Other designs incorporated metal strips riveted longitudinally to an organic canon; a fashion seemingly popular in Italy, Germany and certain areas of France²⁴ (Fig. 4; 5).

There is limited evidence for the use of metal plate arm defences before the 1320s; the inclusion of „arms of iron with couters” („bras de fer et coutes”) in the 1302 de Nesle inventory, for instance, is somewhat ambiguous and could simply be a reference to mail sleeves albeit reinforced with plates over the elbows²⁵. Interestingly, among the relatively long list of metal plate armour being produced in Milan in 1288, de Riva omits any mention of armour for the arms²⁶.



Fig. 5. Funerary brass of William Wenemaer depicted wearing reinforcing plate rondels to the arms in contrast to the more extensively protected legs and feet. The guard-chains attach to the mail, most likely indicating a lack of a plate defence beneath. © Stadtmuseum Gent.

However, by the second quarter of the 14th century the situation had changed with the result that the Florentine Peruzzi company were able to supply significant quantities of plate armour, including for the arms, to the Tower of London in 1322²⁷. From this date arm defences began to develop rapidly so that by the 1330s evidence from manuscripts

²² Quoted in: Moffat et al. 2008, 211.

²³ Buttin 1965, 164; Moffat et al. 2008, 56; Richardson 2013, 56.

²⁴ Buttin 1910, 50; Downen 2015, 43.

²⁵ Downen 2015, 41.

²⁶ Novati 1898, 148-149. This comparatively slow development, compared to armour for the legs, is has been explained by

some scholars as being due to the greater articulation required in the armour for that part of the body, and was thus more technologically complex and difficult to achieve. (see Scalini and Boccia 1982, 83). This theory however, doesn't stand up to scrutiny as early arm defences were of very simple gutter-shaped design. A more likely explanation is that the shield was felt to provide a suitable level protection for the upper body.

²⁷ Mercer 2014, 8.



Fig. 6. Knee and elbow plates, probably of metal, being worn by knight hunting the unicorn c. 1330. Bodley Douce Ormesby Psalter folio 55v. © The Bodleian Library.

and effigies demonstrates that more protective hinged tubular vambraces were being produced (Fig. 6).

From the mid to late 13th century plate gauntlets were developed as an alternative to the mail muffler, most likely due to the vulnerability of the hand to injury²⁸. A popular material used in the construction of gauntlets was baleen. Though extensively used on the tournament field, references to baleen gauntlets for war can also be found throughout our period²⁹. By the early 14th century gauntlets for war occur frequently in wills, inventories and lists of supplies, such as the will of Jehann le Espessier in 1297 and that of Count Robert of Flanders in 1322 who possessed „une paire de wanteles de balainnes entretes de blanc chendal”³⁰.

Gauntlets of metal plate had been developed by the mid-13th century and are mentioned in a number of sources including as de Riva’s invaluable *De magnalibus urbis Mediolan*, along with a number of personal wills such as that of Climence Li Faitice in 1267³¹. By the end of the century the production of plate gauntlets had become a significant industry. In 1296 the Ordonnance de métiers de Paris refers to the production of plate gauntlets, whilst in the following year the 715 pairs of gauntlets ordered for the French invasion of England were to be either of baleen or iron („715 pere de gantelez que de fer que

de baleine”)³². In 1338 563 plate gauntlets („cerotecis de plate”) passed through the Tower of London³³.

Although there are a number of early references to breast defences, armour for the torso only appears to have undergone sustained development from the mid-13th century. Indeed, one scholar has argued that these earlier occasional references to breast defences should not be seen as being directly related to the development of later plate armour³⁴. Leather cuirasses or *cuiries* continued to be widely worn in the later 13th and 14th centuries³⁵. Their precise construction is difficult to determine. However, a reference to „pairs of cuirasses” („paires de cuiraces”) in the c. 1266 inventory of the Comte de Nevers and a number of sculptural sources, such as the effigy of an English knight in Pershore Church and the tomb slab of Sir Brochard de Charpignie, from Cyprus, suggests they comprised both a back and breast-plate which were then strapped or tied together either at the sides or over the shoulders³⁶. The „peaked shoulders” seen in a number of mid-13th century artworks may provide evidence of a stiff leather cuirie being worn beneath the surcoat. However, numerous illustrations in the famous Morgan, or „Maciejowski” Bible and „Trinity Apocalypse”

²⁸ Moffat et al. 2008, 26.

²⁹ Moffat et al. 2008, 209.

³⁰ Quoted in: Williams 2003, 57; Grange, de la 1897, 34.

³¹ Bonghi 2002, 22, and Grange, de la 1897, 28.

³² Quoted in: Moffat et al. 2008, 211, and Gay 1887, 762.

³³ Richardson 2016, 54.

³⁴ See Richardson 1997, 40.

³⁵ Lacy 1992, 1-2.

³⁶ Blair 1979, 39. It should be noted that such depictions may in fact be of „pairs of plates” and not leather „cuiries”.



Fig. 7. „Soldiers depicted wearing surcoats” with peaked shoulders c. 1250 – note the apparent lack of rigid torso defence which may have given the shoulders their distinctive profile. Cambridge R.16.2. Trinity Apocalypse folio 024r. © Trinity College Cambridge.

of such peaked shoulders do not appear to be the result of such defences, but rather of fashion, as only the hauberk is visible in the openings in the surcoat (Fig. 7).

The mid-13th century also saw the introduction of metal plate armour in the form of the pair of plates (commonly termed the „coat of plates”). Though there is a significant amount of debate as to their origin, they may simply have developed out of the cuirie. Matthew Paris’s *Chronica Majora*, for instance, refers to leather armour reinforced with metal plates „they wear raw cow, ass and horse hides. For armour they are protected by iron plates sewn onto the hides which they have used until now” („cruda gestant coira bovina, asine vel equine, insutis laminis ferreis pro armis muniuntur quibus hactenus usi sunt”)³⁷. The pair of plates was a poncho-like garment made of a series of metal plates riveted to the inner face of an organic covering, providing protection for the front, back and sides of the wearer. Early references include, according to Thordeman, a Florentine war order of 1259-1260 and a mercenary contract with the town of Massa³⁸. They were clearly prevalent and are listed in numerous inventories including de Nesle

(1302), Louis X (1316) and the English nobleman Humphrey de Bohun, Earl of Hereford (1322)³⁹. By 1338 the Tower of London alone held 800 pairs of plates for the war with France⁴⁰ (Fig. 8; 9; 10).

There are a number of accounts which reveal the effectiveness of plate armour over mail. In contrast, at the siege of Tournai in 1340 Froissart relates how Lord Godemar du Fay survived for he „was shot in the plates of armour, and the arrow remained stuck in”⁴¹. As early as 1266 at the battle of Benevento chroniclers described how the plate armour, presumably pairs of plate, worn by the Germans made them invulnerable to the blows of the French⁴².

Various theories have been advanced to explain the development of metal plate armour. These have included improved technology leading to the production of larger plates, the rise of banking and financial investment in technology, and perhaps the most popular, at least among some British scholars, the use and power of the longbow⁴³. Whilst an improvement in metals technology does have strong support, it should be remembered that armourers had been able to produce single-piece helmets and multi-piece great-helms for many years. They therefore certainly had the capability to produce armour for the rest of the body. It is thus likely that technology only began to have

³⁷ Quoted in: Thordeman 2001, 448-449.

³⁸ Thordeman 2001, 288 – unfortunately the author has been unable to track down the original documents. Lachaud, in her article Lachaud 1998, erroneously lists the presence of ba-len gauntlets at Carmarthen Castle in 1278. The document in question, National Archives (UK) E 101/2/23, actually refers to a list of equipment in Caernarfon Castle in 1306 – thanks to Bob Woosnam-Savage, curator of armour and edged weapons at the Royal Armouries for drawing my attention to this.

³⁹ Kelly 1905, 468; Mann 1922, 55; Hewitt 1967, 135.

⁴⁰ Richardson 2013, 54.

⁴¹ Richardson 2013, 95.

⁴² Oman 1924, 502.

⁴³ Gamber 1998, 34; Strickland and Hardy 2005, 270-271.



Fig. 8. Solider depicted wearing what appears to be a pair of plates c. 1275. ThULB MS.Bos.q.3 Jena Martyrology folio 083v. © Thüringer Universitäts- und Landesbibliothek.

a marked effect in the second half of the 14th century, when we see the production of larger iron and steel plates⁴⁴. Whilst there is certainly no one single explanation for the introduction and development of plate armour, developments in crossbow technology appears to have been a primary stimulus⁴⁵.

In contrast to the longbow, the crossbow was the most widespread missile weapon in Europe. The list of noble victims is long and famously includes King Richard I of England (1199), Englishman Eustace de Vesci, Lord of Alnwick (1216), Frenchman Guy de Montford, Lord of Sidon (1218) and the Fleming Baldwin III, Count of Guisnes (1233) to name but a few. Though it is true that the crossbow had been in use for many years, from the mid-13th century, no doubt influenced by Asiatic examples, increasingly stronger bows were being produced utilising the tensile strength of horn and sinew which resulted in a greater power to weight ratio⁴⁶. The introduction of crossbows into Livonia in the 13th century, and in particular the use of composite technology is thought to have had a significant impact on warfare in the region⁴⁷. The Tower of London, for example, was producing composite bows of yew and whalebone; the latter also being used in the construction of crossbows along the Baltic coast⁴⁸. The effects of

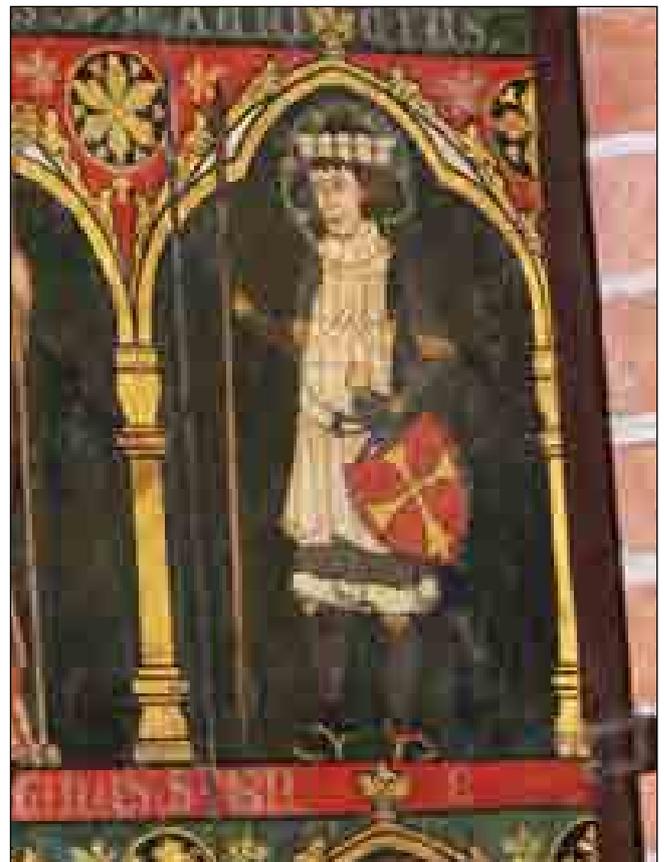


Fig. 9. St Maurice shown wearing a pair of plates on a painted wooden reliquary panel c. 1300. Løgumkloster. Image reproduced courtesy of Wolfgang Sauber.

⁴⁴ Ayton 1999, 202.

⁴⁵ Richardson 1997, 43.

⁴⁶ Ekdahl 1998, 137; Nicole 1999, 10, 12; Breiding 2013, 92.

⁴⁷ Ekdahl 1998, 137

⁴⁸ Paterson 1990, 50; Nicolle 2014, 16.



Fig. 10. Pair of plates excavated from the castle of Küssnach c. 1325-1350. LM-13367. © Schweizerisches Landesmuseum Zürich.

composite bows could be devastating; the 15th century Italian historian Bernardo Justini, recounting that in 1246 the Genoese were deprived of an eye and an arm in revenge for the loss of life inflicted by (their) crossbows⁴⁹. These weapons were justifiably popular and occur in a number of contemporary accounts including personal inventories; that of Mahaut, sovereign Countess of Arbois in 1313 containing 30 horn crossbows: „It. 30 arbalestes de cor”⁵⁰.

These more powerful crossbows necessitated the development of spanning devices. One of the simplest was the belt and claw which is first recorded at the end of the 12th century and appears in numerous artistic depictions throughout the 13th century⁵¹. This simple aid utilised the strength of the crossbowman’s entire upper-body to draw back the string, rather than just the arms. A further development, which probably took place in the late 13th or

early 14th centuries was the so-called „goat’s foot lever”⁵². This was a simple folding device which allowed for significantly greater draw-weights, and thus even greater power⁵³. In 1307 and 1308 the city of Hamburg bought ten *balistas dorsalis* or *Ruckarmbrusten* which have been identified as being spanned either with a belt-hook or a goat’s-foot lever⁵⁴. Significantly these developments in crossbow technology coincide with the increasing use of plate and specifically metal plate armour for the torso on the battlefield.

Close examination of the documentary evidence reveals that plate armour was in use much earlier and in greater quantities than has commonly been assumed. Although mail provided an effective defence against most weapons, it was nonetheless vulnerable to penetrative

⁴⁹ Quoted in: Payne-Gallwey 1963, 62-63.

⁵⁰ Gay 1887, 42.

⁵¹ Gay 1887, 41.

⁵² Paterson 1990, 40-48.

⁵³ Breiding 2013, 95.

⁵⁴ Nicolle 2014, 17.

attacks. As a result from the mid-13th century reinforcing plates, either of leather, cuir-bouilli, baleen or iron, were being added to the most vulnerable parts of the body. Over the subsequent decade the demand for iron and steel armour grew, so that by the end of the century cities such as Milan were home to plate armourers' workshops. The development of plate armour, though, was erratic with some parts of the body receiving better protection than others. The introduction of composite crossbows and improvements in spanning technology appear to have been one of the main stimuli. Undoubtedly though, this particular issue

and that of regional trends in the adoption of plate armour, requires more research.

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Streszczenie

Początki i rozwój zbroi płytowej w średniowiecznej Europie Zachodniej w latach ok. 1250-1350

Stulecie po 1250 r. to czas szybkiego rozwoju i eksperymentów w dziejach zbroi europejskiej. Mimo że do naszych czasów dotrwało bardzo niewiele zachowanych zabytków zbroi, przedstawienia artystyczne, testamenty, inwentarze i współczesne relacje świadczą o znacznie wcześniejszym użyciu elementów zbroi wykonanych z płyt metalowych, niż dotychczas powszechnie sądzono. Do początku XIV wieku uległy wykształceniu wszystkie główne elementy zbroi płytowej, a następne pięćdziesiąt lat to czas upowszechnienia się osłon płytowych na polach bitew. Z drugiej strony, rozwój zbroi płytowej dokonywał się w sposób niezwykle nieregularny i nie przebiegał linearnie. Wciąż nie do końca poznane są czynniki, odpowiedzialne za rozwój zbroi płytowej. Można jednak przyjąć, iż mógł mieć tu istotne znaczenie postęp w technologii produkcji kuszy.