MARCIN GLINIANOWICZ

THE BRIGANDINE FROM THE POLISH ARMY MUSEUM IN WARSAW – SOME THOUGHTS ABOUT ITS PROVENANCE AND CHRONOLOGY

Polish museum collections do not possess a lot of extant examples of late medieval armour, therefore each of them deserves special attention. The brigandine from the Museum of the Polish Army in Warsaw has not been given a lot of attention so far in Polish literature on the history of arms and armour. There is only a scant note about this armour in the catalogue of the collections of the Museum of the Polish Army by Zofia Stefańska (Stefańska 1960, p. 20; 1964, fig. 32: a, b).

The brigandine in question is catalogued as inv. No. 107 and was brought into the Polish museum collection after WWII.[1] There are indications that it formerly belonged to Berlin's Zeughaus, which is corroborated by a comparative analysis of photos published in some older studies (cf. i.e, Thordeman 1939, figs. 349, 350). Considering the shape of individual plates, the pattern of rivets, the condition and the extent of damage of the covering cloth, and the outline of the present edges of the brigandine we can be almost certain that the piece belonging presently to the Museum of the Polish Army in Warsaw is the same one which is shown on the pages of Thordeman's "Armour from the battle of Wisby."

Only the front half of the armour has survived, probably incomplete in its upper part, as proven by an analogy (discussed below). Conservation work done after 1960 to protect the brigandine from further damage makes a detailed analysis difficult. The brigandine was placed on a shaped steel sheet (fixed in place with several screws!), and covered with a thin mesh overlapped and glued to the bottom side of the base (Figs. 1–9). Because of this we are not able to measure all of the plates, check for any marks on their surfaces or take a larger sample of the textile covering for analysis.

Based on the pattern of rivet heads on the fabric and the photos made before 1960 we can conclude that the brigandine consists of a large chestplate and over 200 oblong, rectangular, horizontally aligned small plates of roughly uniform size (Fig. 10). The large chestplate has straight, horizontal upper and lower edges and almost vertical side edges with prominent, curved openings for arms. It is not very convex, but it was obviously shaped for close and comfortable fit. We can gather some information about the exact arrangement of the smaller plates from archival photos (Thordeman 1939, figs. 349, 350; Post 1942, fig. 1, 2; Stefańska 1960, p. 21; Žákovský 2009, fig. 6: 2). Most of them are rectangular, rhomboidal or trapezoidal, with rounded points, curved along the longer side (Fig. 10). Such shape was of course supposed to follow the natural curves of the human torso. The plates in the single, horizontal row at the waist-height are shaped somewhat differently. They are shaped and curved as others but additionally they were bent along the horizontal axis of symmetry so that they resemble the letter V in cross-section with the ridge pointing towards the body of the wearer. This was probably done to accentuate the waist and for a better fit. It is worth mentioning that the civilian fashion of the late 14th – early 15th cent. favoured close fitting garments

[1] The author would like to thank The Management of the Museum of the Polish Army in Warsaw for permission to publish this brigandine and Wojciech Krajewski from the Museum of the Polish Army in Warsaw for his help during making the documentation.

Fig. 1. The brigandine from Polish Army Museum in Warsaw. Front view. Photo by T. Rajtar

with a pronounced waistline (see i.e. Gutkowska-Rychlewska 1968, pp. 148–157).

Individual metal elements of the discussed brigandine are not joined together in any way. The only element that holds them together is the textile covering, to which the chestplate and smaller plates were riveted with steel rivets with flat, round heads (the chestplate around its circumference, every smaller plate with 3 or 4 rivets in a row along the upper or lower edge). In the middle of the chestplate we can

Fig. 2. The brigandine from Polish Army Museum in Warsaw. Photo by T. Rajtar

see an isosceles cross made of the same rivets. In the lower part of the textile covering, along its vertical axis of symmetry, there is a rectangular opening ("a slit") which could facilitate walking and mounting a horse while wearing the armour. It is worth mentioning that the smaller plates were fixed to the covering in two different ways. Those below the chestplate were riveted along their lower edges, while those below the waist are riveted along their upper edges.

In its present condition the brigandine weighs 4137 g, however this includes the 1.4 mm thick steel plate the armour was screwed to during the aforementioned conservation works. The total height of the breastplate is 52 cm. The large chestplate is 22.5 cm high, while its width is[2]: 24 cm (upper edge), 47.5 cm (between the points under the "armpits" of

[2] All measurements of the width and height of the brigandine and its individual plates were made along the arcs of their curves.

Fig. 3. The brigandine from Polish Army Museum in Warsaw. The right side. Photo by T. Rajtar

Fig. 4. The brigandine from Polish Army Museum in Warsaw. The left side. Photo by T. Rajtar

Fig. 5. The brigandine from Polish Army Museum in Warsaw. Chestplate. Photo by T. Rajtar

Fig. 6. The brigandine from Polish Army Museum in Warsaw. Photo by T. Rajtar

Fig. 7. The brigandine from Polish Army Museum in Warsaw. Photo by T. Rajtar

Fig. 8. The brigandine from Polish Army Museum in Warsaw. Photo by T. Rajtar

Fig. 9. The brigandine from Polish Army Museum in Warsaw. Profile of the brigandine. Photo by T. Rajtar

the wearer) and 45 cm (lower edge). The smaller, rectangular plates are ca. 7.59×2.94 cm, however this is an approximation based on their outline showing from beneath the textile covering. The width of the brigandine in its probable "waistline" is 40.5 cm, while its lower edge is 45.5 cm wide. Flat, round rivet heads fixing the chestplate and smaller plates to the textile covering are very similar in shape and measure 4.81–5.64 mm in diameter.

The textile covering of the Warsaw brigandine is damaged in many places, but it still retains its original function of covering and holding together all the elements constituting the protection of the wearer's torso. It is not made from a single piece of fabric, and we can see two horizontal seams in the lower part and one vertical seam in the middle, running from the lower edge of the chestplate to the lower edge of the whole breastplate. While the horizontal seams were obviously supposed to make up for the lack of the fabric in its length, the vertical one could provide a better fit of the covering to the curve of the chestplate, which in turn was fitted to the contours

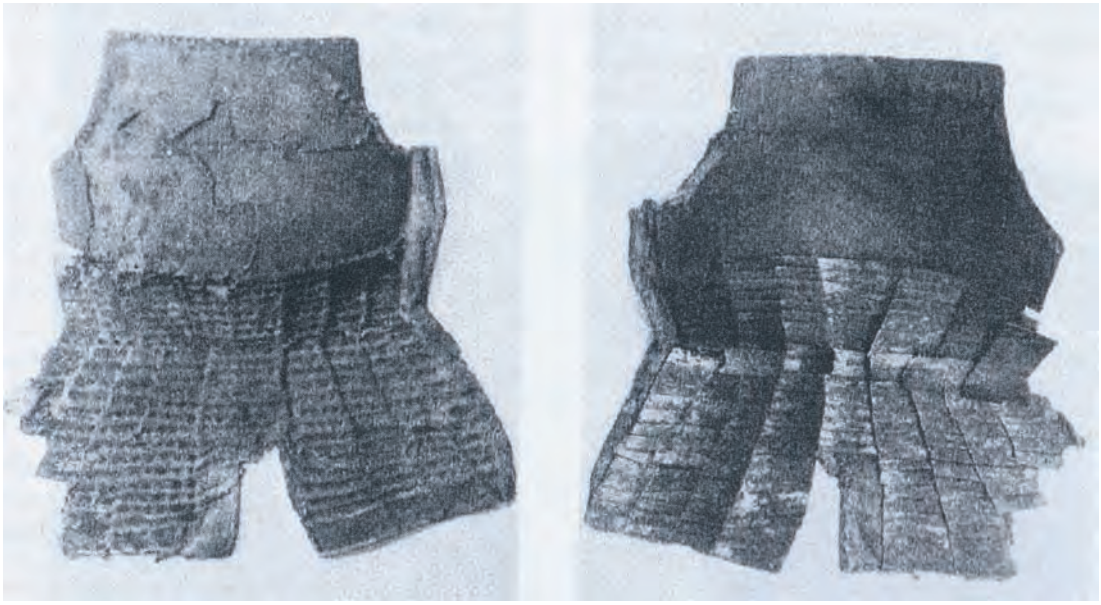

Fig. 10. The brigandine from Berlin's Zeughaus (probably the same that brigandine from PAM in Warsaw). After B. Thordeman 1939, fig. 349, 350

of the human body. At present the textile covering is brown, but it is rather impossible to say what the original colour of the fabric was.

A small fragment of the covering, obtained through a hole in the protective mesh covering the armour was analysed in the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Lódź. The results of this analysis are presented in the addendum to this article.

The closest analogy to the brigandine from the MPA in Warsaw is the armour from Castello Sforzesco in Milan - inventory No. 161 (Figs. 11–20).[3] Contrary to the Polish armour, the Italian one is preserved intact. We can see a more complex breastplate with

[3] The author would like to thank Valentina Ricetti from Castello Sforzesco in Milan for information about the brigandine mentioned in this article.

Fig. 11. The brigandine from Castello Sforzesco in Milan. The right side. Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

Fig. 12. The brigandine from Castello Sforzesco in Milan. Front view. Photo by T. Capwell.
Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

rectangular plates covering shoulders and collarbones of the wearer above the chestplate (Fig. 16). The Milanese armour has also a backplate consisting of a large, square plate and two rows of rectangular plates at its sides (Figs. 13, 17). It is worth pointing out that wherever there are no plates, the textile cover-

Fig. 13. The brigandine from Castello Sforzesco in Milan. Backplate. Photo by T. Capwell.
Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

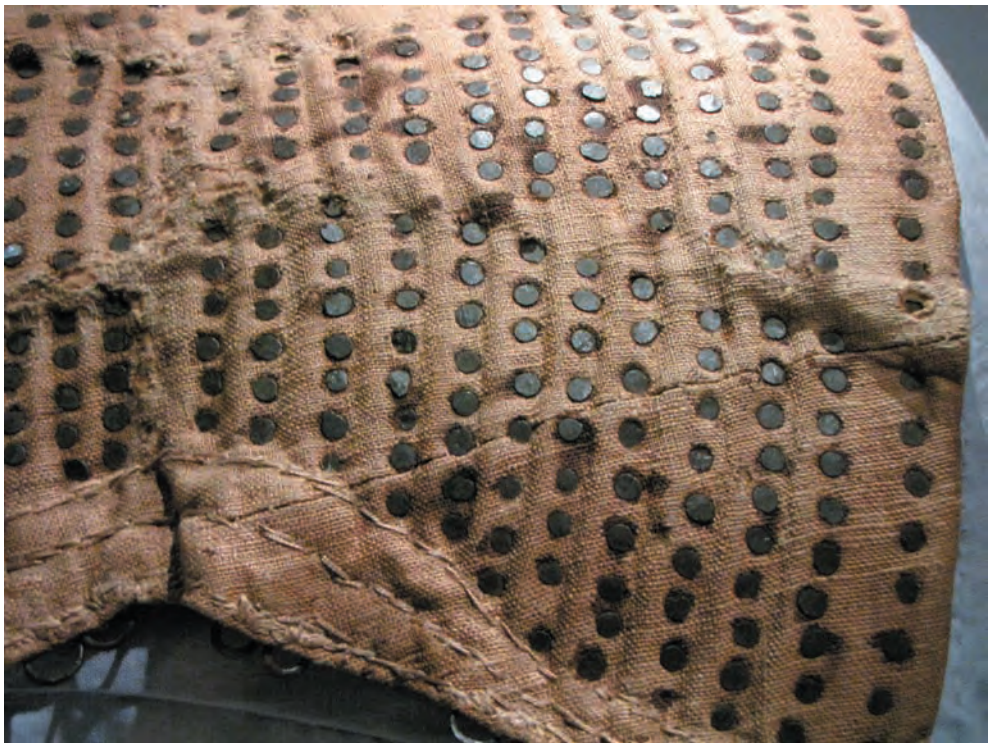

Fig. 14. The brigandine from Castello Sforzesco in Milan. Rivet heads on breastplate.
Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano,
all rights reserved

ing is lined with mail, providing a full protection of the torso and neck of the wearer (Figs. 15, 18). The breastplate and the backplate were fastened on the shoulders and sides with a string or a leather strap tied through holes in the covering and some metal rings sewn to it (Figs. 16, 18). Analogically to the

Fig. 15. The brigandine from Castello Sforzesco in Milan. Backplate, mail lining the textile covering.
Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano,
all rights reserved

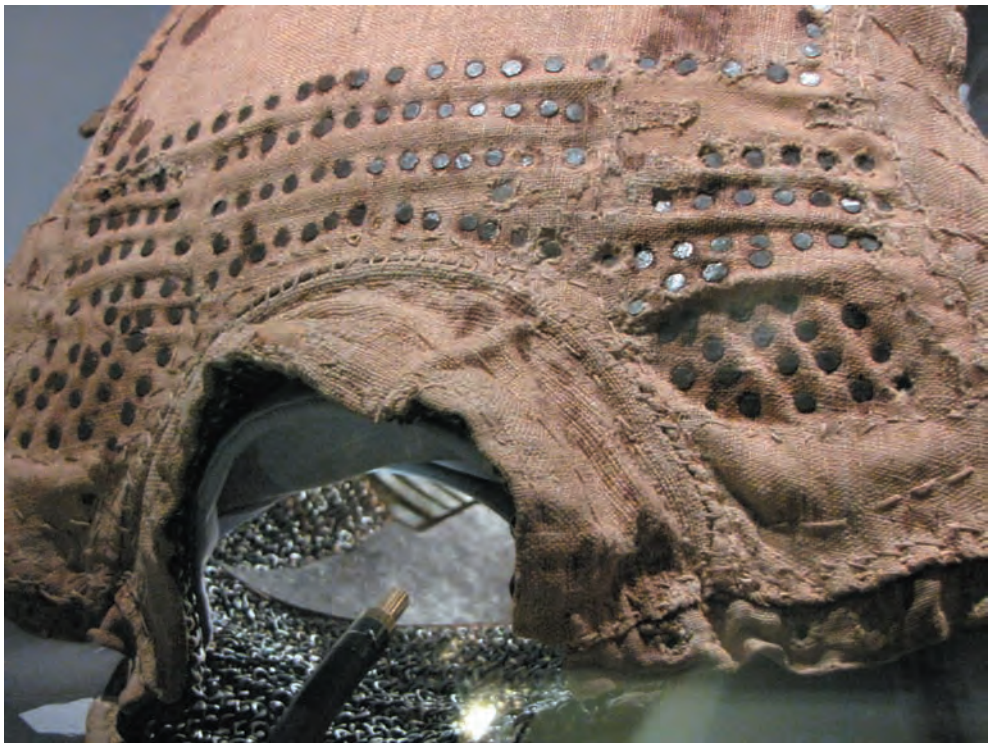

Fig. 16. The brigandine from Castello Sforzesco in Milan. Breastplate, plates above the chestplate and holes for fastening on the shoulders. Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

armour from the MPA in Warsaw the brigandine from Milan is covered with linen fabric and has identical, isosceles crosses made with rivets on its chest- and backplate. On small plates from the Italian brigandine there is an armourer's mark (a cross above the letter I, surrounded by letters Z and O), associated with

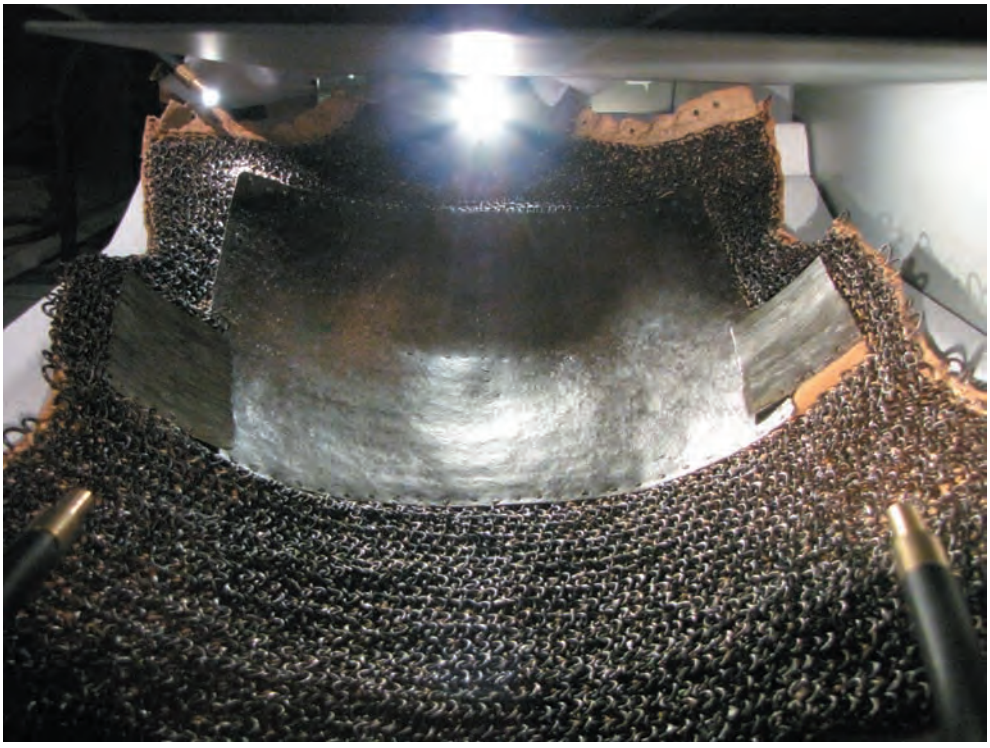

Fig. 17. The brigandine from Castello Sforzesco in Milan. Backplate. Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

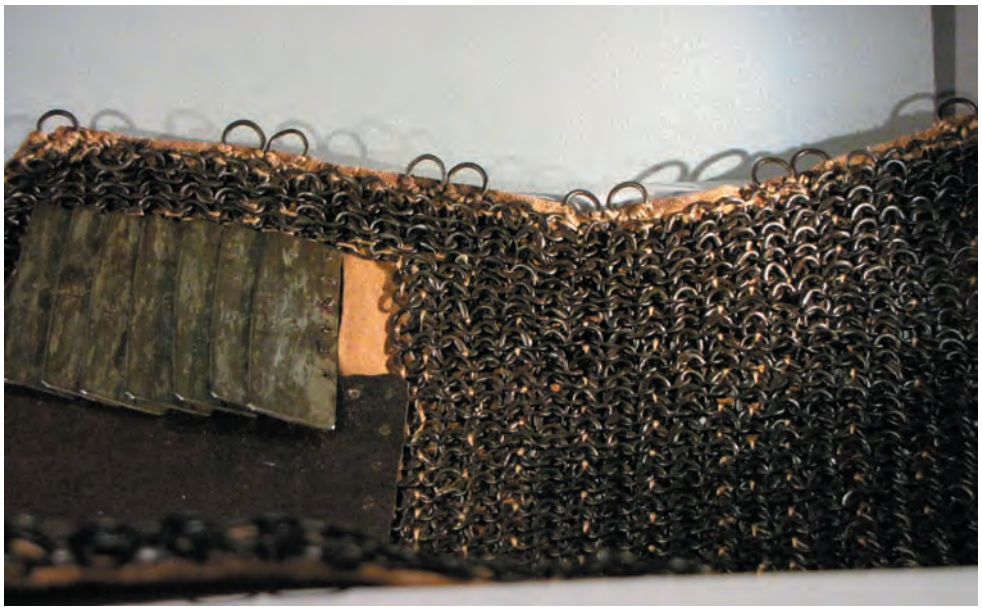

Fig. 18. The brigandine from Castello Sforzesco in Milan. Backplate, metal rings for fastening. Photo by T. Capwell. Civiche Raccolte d'Arte Applicata del Castello Sforzesco, Milano, all rights reserved

an unspecified Milanese workshop (Fig. 21). The punched mark is repeated two times on the side rows of plates and once in the central one of the breastplate each small plate on backplate has only one mark too. The plates around the waist, those of the left and right shoulder plates, those under the neck opening and the great breast- and backplate are not marked.

In Italian literature on medieval arms and armour such defenses of the torso, consisting of large, shaped plates, smaller plates and pieces of mail, covered with linen fabric, silk velvet or leather are called "corazzinas." Italian researchers distinguish between corazzinas and brigandines – the latter being supposedly very similar but consisting of small plates only. Corazzinas were very popular in Italy from the 1370s to the 1450s (Scalini 2003, pp. 382–396). The discussed armour from Milan is dated to 1380–1410 (Allevi 1998, p. 25).

Such dating of textile-covered body defenses with large chest- and backplates, supplemented with smaller ones, is confirmed by Italian iconography of the late 14th century. As an example we can give a poem "Lancelot du Lac" dated to ca. 1380, where we can see a full body defense with densely spaced rivet heads on the covering. In the chest area we can see an empty space with no rivet heads, from which we can conclude the existence of a large chestplate (Fig. 22). In the same poem it is worth pointing out a kneeling knight's figure wearing a corazzina covered with red fabric, with a fragment of the cross (prob-

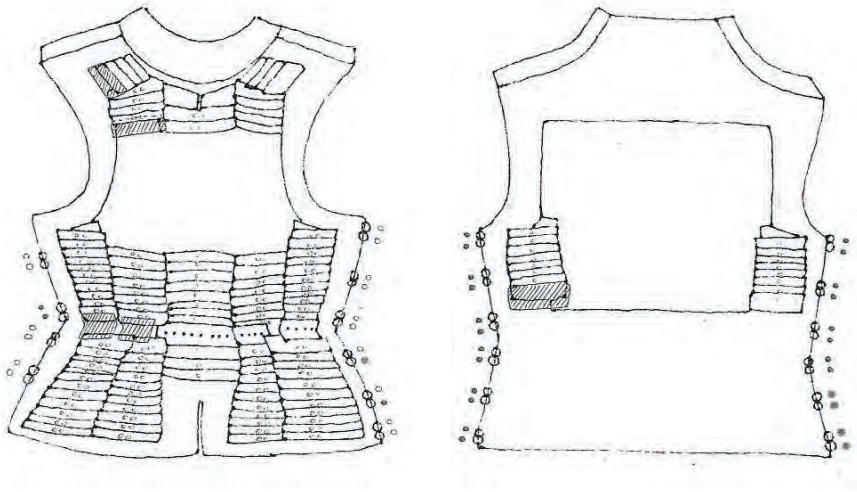

Fig. 19. The brigandine from Castello Sforzesco in Milan. Drawing from the restoring report

Fig. 20. The brigandine from Castello Sforzesco in Milan. Breast- and backplate. After P. Allevi 1998, fig. 25

Fig. 21. Armourer's mark from the Milanese brigandine. Drawing from the restoring report

ably isosceles) visible on the breastplate, similar in shape to the crosses on the armours from Milan and Warsaw (Fig. 23).

Another proof, from Italy, of widespread use of torso defenses made of great chest- and backplates supplemented with smaller plates and covered by fabric or leather in different colours are the frescoes from the chapel of St George in Padova by Altichiero da Zevio, finished about 1384 (Figs. 24–28) (Baggio, Colalucci, Bartoletti 1999).

Fig. 22. Italian poem "Lancelot du Lac"

Discussing the brigandine from the MPA in Warsaw is a good opportunity for a short summary of the development of textile/leather-covered body defenses.

The first certain example of such armour is the sculpture of St Maurice in Magdeburg Cathedral, dated to ca. 1250. The figure of this holy warrior wears a long surcoat lined with rectangular, vertical plates (Thordeman 1939, pp. 285–286, figs. 288, 289). A similar reinforcement of a surcoat can be observed on a sleeping knight's figure on the altar in the monastery in Wienhausen from ca. 1280 (Edge,

Fig. 23. Italian poem "Lancelot du Lac"

Fig. 24. The frescoes from the chapel of St George in Padova by Altichiero da Zevio

Fig. 25. The frescoes from the chapel of St George in Padova by Altichiero da Zevio

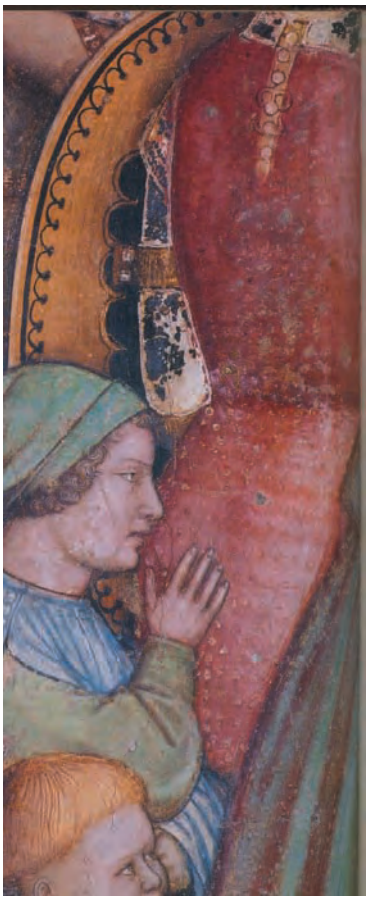

Fig. 26. The frescoes from the chapel of St George in Padova by Altichiero da Zevio

Paddock 1988, p. 59). Implementation of metal plates was probably caused by the growing force of impact of the lance-wielding heavy cavalry and much more effective ranged weapons. Coat of mail with a padded gambeson beneath it alone were not enough to withstand a thrust by a lancehead. It seems safe to assume that such solution was borrowed from the Islamic culture via the workshops of Northern Italy. It is also possible that a certain role in introducing such armour to European armourers and warriors was played by nomadic Mongols, who appeared in the European history in the 13th century (Thordeman 1939, pp. 288–290; Nicolle 2002, pp. 213, 216, 220–221).

This design quickly became very popular and was commonly called coat of plates throughout all Europe. The popularity of such refined textile "vest" lined with riveted metal plates is proven by the famous archaeological find from the battlefield of Wisby, 1361. Coats of plates from Gotland present some variety of design, but they are still all based on rectangular plates of various sizes and various numbers in a given piece, aligned horizontally or vertically (Thordeman 1939; 1940).

It seems that from this point on the process of development of textile-covered body defenses may have been bilinear (Nadolski, Kosiorek 1986, p. 36, footnote 2; Nowakowski 1990, pp. 66–67).

The first line could consist in dividing individual plates into further smaller pieces, a final product of this process being the classic brigandine known from museum collections and iconographical sources from the 14th to the 17th century (Blair 1958, p. 59). Such an armour, thanks to employing a large number of small plates, was more elastic and could be better fitted to the wearer's body following the dictates of current civilian fashion. While such arrangement could be more comfortable and efficient for light cavalrymen and infantry, it seems that heavy cavalry were more interested in making the body defenses more stiff and resistant, especially in the most vital chest area. Using a solid, large chestplate[4] gave better chances of surviving the contact with a massive

[4] In several examples chestplates of brigandies consist of two, symmetrical pieces – left and right (Ffoulkes 1911, Plate LIV; Angermann, Poyer 2004, figs. 1, 3, 6; Beaufort-Spontin 2004, fig. 1; Marek, Konczewski 2010, fig. 6: 3)

Fig. 26. The frescoes from the chapel of St George in Padova by Altichiero da Zevio

Fig. 28. The frescoes from the chapel of St George in Padova by Altichiero da Zevio

lancehead of the charging mounted opponent of a considerable mass.

Therefore it seems obvious that the second line of development of covered body defenses was focused on fusing the plates together (Blair 1958, p. 56). Perhaps at first it was achieved by riveting several neighbouring plates together; the next step could be forging a single chestplate that protected the wearer's chest around the heart. The rest of such armour was still made of rectangular, most often horizontally aligned plates. It seems that a perfect example of such armour is the one from Hirschstein Castle in Passau, dated to ca. 1350 (Herman *et. al.* 2007, pp. 436–437), and numerous tombstones from that time for example: the effigy of Otto von Orlamünde ca. 1340; Rudolf von Hürnheim ca. 1350–1360 or Walter von Bopfinger ca. 1359 (see i.e. Thordeman 1939, figs. 324–329). This kind of armour evolved towards enlarging the chestplate until it protected the whole torso (from collarbones to waist). The underbelly and hips were protected by a skirt of lames made of long, horizontal plates. The whole armour was still covered with fabric, linen or something more decorative like silk velvet. An example of the pinnacle of such armour is the piece from the National Museum in Munich, dated to ca. 1400 (Peine 2004, p. 54, fig. 9). It is undoubtedly an introduction to full-plate alwite breastplates.

In Polish studies on arms and armour there is a clear distinction in terminology of textile covered armours: the defenses with large chestplates and backplates are called "textile-covered cuirasses," as opposed to armour made exclusively of smaller plates, which is called "coat of plates" (plates being rather large) or "brigandine" (plates being very small and numerous), (Nowakowski 1990, pp. 64, 66–67).

The last thing to consider is the origin of the armour from the Museum of the Polish Army. As it was already mentioned, it does not come from Poland, and available analogies suggest to look for the place of its origin in Italy. The piece from Milan is almost identical, but until we are not able to find any armourer's marks on the one from Warsaw it will not be possible to answer this question beyond doubt.

One could wonder if cloth-covered armour of this type may have been used by warriors from the Kingdom of Poland in the late 14th and the beginning

of the 15th century. Unfortunately Polish iconography from this period does not show us any unquestionable examples of cloth-covered armour. Some evidence of its existence can be found in written sources, where one finds elements of armour called "duae ioppe" and "plathae" (similar to medieval names from other countries, such as English "plates," French "pair de plattes," German "plate" and Czech "pláty") (Nowakowski 1990, pp. 64–65). Interestingly, the prices of those "duae ioppe" and "plathae" are several times higher than the prices of "brostblechs," appearing in the same timeframe and being probably early versions of breastplates (Szymczak 1989, pp. 114–115). Perhaps this difference tells us that the "brostblechs" were a simple form of a covered or alwite breastplate, without the skirt of lames or any other supplementing protection, and "plathae" from this time is a torso protection similar to the armour from Warsaw and Milan, fitted to the wearer's body and requiring much more work and precision. The price could also be raised by covering plates with fabric more expensive than simple linen, for example silk velvet, and using bronze or copper rivets with decorative heads. Of course it is but a hypothesis that requires scientific verification. Nonetheless it remains a fact that during numerous excavations in late medieval castles and small strongholds ("motte") in Poland archaeologists found armour plates of different size and shape that confirm the use of covered armour in the Kingdom of Poland.[5]

[5] It is worth to mention finds of plates from: Siedlątków (Nadolski 1963, pp. 91–92, figs. 7–10; Nadolski 1969, pp. 12–18, figs. IV-IX); Plemięta (Nadolski, Grabarczykowa 1985, pp. 87–91, figs. 21–24); Borówek (Nadolski, Kosiorek 1986, pp. 33–41; Kosiorek 2002, p. 230); Nowe Miasto (Grygiel, Jurek 1996, pp. 84–90, figs. 73–99, 102–103); Popów (Dudak 2004–2005, pp. 205–216); Czchów (Szpunar, Glinianowicz 2006, pp. 142–153).

BIBLIOGRAPHY

Allevi P.
1998 *Museo d'Arti Applicate – Armi Bianche*, Milano.

Angermann Ch., Poyer M.
2004 *Konservatorische Bestandsaufnahme der Brigantinen im Kunsthistorisches Museum in Wien,* (in:) K. Spindler (ed.), Das Brigantinen-Symposium auf Schloss Tirol, Tirol, pp. 145–191.

Baggio L., Colalucci G., Bartoletti D.
1999 *Altichiero da Zevio nall'oratorio di San Giorgio. Il restauro degli affreschi*, Padova.

Beaufort-Spontin Ch.
2004 *Zum Brigantinen-Bestand in der Hofjagd- und Rüstkammer des Kunsthistorischen Museums in Wien,* (in:) K. Spindler (ed.), Das Brigantinen-Symposium auf Schloss Tirol, Tirol, pp. 130–144.

Blair C.
1958 *European Armour circa 1066 to circa 1700*, London.

Dudak W.
2004–2005 *Szczątki zbroi średniowiecznej z grodziska w Popowie, woj. łódzkie*, Łódzkie Sprawozdania Archeologiczne, Vol. 9, pp. 205–216.

Edge D., Paddock J.M.
1988 *Arms and Armour of the Medieval Knight*, London.

ffoulkes Ch.
1911 *On Italian Armour from Chalcis in the Ethnological Museum at Athens*, Archaeologia or Miscellaneous Tracts Relating to Antiquity, Vol. 62, pp. 381–390.

Herman F., Herman W., Rief T., Wagner E. L.
2007 *Hermann Historica OHG, München. 52. Auktion. Alte Waffen – Antiken – Jagdliches – Varia*, München.

Grygiel R., Jurek T.
1996 *Doliwowie z Nowego Miasta nad Wartą, Dębna, i Miechowa. Dzieje rezydencji i ich właścicieli*, Łódź.

Gutkowska-Rychlewska M.
1968 *Historia ubiorów*, Warszawa.

Kosiorek A.
2002 *Dwór „na kopcu" w Borówku – wyniki badań archeologicznych*, Prace i Materiały Muzeum Miasta Zgierza, Vol. 3–4, pp. 223–239.

Marek L., Konczewski P.
2010 *Oblężenie i upadek zamku Karpień. Interpretacja źródeł archeologicznych*, Acta Militaria Mediaevalia, Vol. 6, pp. 93–120.

Nadolski A.
1963 *Hełm i fragmenty zbroi z Siedlątkowa*, Prace i Materiały Muzeum Archeologicznego i Etnograficznego w Łodzi, Seria Archeologiczna, Vol. 15, pp. 89–93.
1969 *Hełm i fragmenty zbroi z XIV wieku znalezione w Siedlątkowie nad Wartą*, Studia i Materiały do Dziejów Dawnego Uzbrojenia i Ubioru Wojskowego, Vol. 6, pp. 5–33.

Nadolski A., Grabarczykowa E.
1985 *Militaria z grodziska w Plemiętach. Uzbrojenia ochronne,* (in:) A. Nadolski (ed.), *Plemięta. Średniowieczny gródek w Ziemi Chełmińskiej,* Warszawa-Poznań-Toruń, pp. 85–98.

Nadolski A., Kosiorek A.
1986 *Szczątki zbroi średniowiecznej z grodziska w Borówku,* (in:) T. Poklewski (ed.), *Studia nad kulturą materialną wieków od XIV do XVI,* Acta Archaeologica Lodziensia, Vol. 32, pp. 33–41.

Nicolle D.
2002 *Jawshan, Cuirie and Coats-of-Plates: An Alternative Line of Development for Hardened Leather Armour,* (in:) D. Nicolle (ed.), *A Companion to Medieval Arms and Armour*, Woodbridge, pp. 179–220.

Nowakowski A.
1990 *Uzbrojenie ochronne,* (in:) A. Nadolski (ed.), *Uzbrojenie w Polsce średniowiecznej 1350–1450*, Łódź, pp. 31–110.

Peine H.W.
2004 *Ein Blick in die Waffenkammer des Hauses Herbede an der Ruhr,* (in:) K. Spindler (ed.), Das Brigantinen-Symposium auf Schloss Tirol, Tirol, pp. 40–77.
Post P.
1942 *Ein Panzerfragment aus der Frühzeit der Brigantine*, Zeitschrift für Historische Waffen- und Kostümkunde, Neue Folge, Vol. XVI, No. 7, pp. 225–239.
Scalini M.
2003 *Corazzine e bacinetti dalla Rocca di Campiglia,* (in:) G. Bianchi (ed.), Campiglia. Un castello e il suo territorio, Firenze, pp. 382–396.
Stefańska Z.
1960 *Muzeum Wojska Polskiego w Warszawie. Album zbiorów wieku X-XV*, Warszawa.
1964 *Pancerze w Polsce średniowiecznej*, Muzealnictwo Wojskowe, t. II, pp. 73–141.
Szpunar A., Glinianowicz M.
2006 *Uzbrojenie późnośredniowieczne z zamku w Czchowie w Małopolsce*, Acta Militaria Mediaevalia, Vol. II, pp. 137–188.
Szymczak J.
1989 *Produkcja i koszty uzbrojenia rycerskiego w Polsce XIII-XV w.*, Łódź.
Thordeman B.
1939 *Armour from the Battle of Wisby*, Vol. I. Text, Upsalla.
1940 *Armour from the Battle of Wisby*, Vol. II. Plates, Upsalla.
Žákovský P.
2009 *Hromadný nález nejstarších platnéřských praci z území Moravy (?)*, Archaeologia Historica, Vol. 34, pp. 409–444.

ŁUKASZ ANTOSIK

APPENDIX

The technological analysis of the fragment of textile covering of the brigandine from the Museum of the Polish Army in Warsaw

The research was conducted in the Institute of Archeology and Ethnology of the Polish Academy of Sciences in Lódź. The researched object was a small, well preserved fragment of fabric measuring 0.4×0.5 cm in size. The observations allowed to conclude that it was a vegetable material, most likely flax.

The fabric was tabby-woven, which means that there is 1 thread of the warp for each 1 thread of the weft. Such weave is commonly employed in textile weaving from Neolithic times until today. The yarn used for weaving was Z-spun in weft and warp as well. The warp threads are ca. 0.2 mm thick, while the weft threads are ca. 0.4 mm thick. The warp-thickness of the fabric in the analysed fragment is ca. 10 threads per 1 cm, while the weft-thickness is 7–8 threads per 1 cm (because of the small size of the fragment the data is given approximately per 1 cm).

To sum up, this is a fragment of a simple fabric. Linen fabric was good at absorbing moisture, which was surely a very important factor considering its role. Textile finds of similar technological properties are known from archaeological research conducted in whole Poland (see: Jabłońska 2009; Maik 1997; Turnau 1987).

BIBLIOGRAPHY

Jabłońska J.
2009 *Tkaniny z badań archeologicznych na Wyspie Spichrzów w Gdańsku w latach 2004–2006,* (in:) H. Paner, M. Fudziński, Z. Borcowski (eds.), Stan badań archeologicznych miast w Polsce, Gdańsk, pp. 201–214.
Maik J.
1997 *Wstępne wyniki badań średniowiecznych i nowożytnych tekstyliów z wykopalisk w Elblągu,* Archaeologia Elbingensis, Vol. 2, pp. 155–170.
Turnau I.
1987 *Historia europejskiego włókiennictwa odzieżowego od XIII do XVIII w.*, Wrocław.

Marcin Glinianowicz, MA
The Museum of Folk Architecture in Sanok
3 Traugutta St.
38–500 Sanok
marcin.glinianowicz@gmail.com

Łukasz Antosik, MA
Institute of Archaeology and Ethnology
of Polish Academy of Sciences in Lódź
1 Tylna St.
90–364 Łódź
l.antos@wp.pl