

WITH OR WITHOUT A HELMET. SOME REMARKS  
ON EQUIPMENT ANALYSIS OF THE MERCENARY TROOPS  
IN POLAND IN THE LATE 15<sup>TH</sup> CENTURY

In the Polish medievalist literature regarding the second half and the late 15<sup>th</sup> c. the fact of a substantial unification of helmet types is stressed, especially those for mercenary infantry and cavalry (Nowakowski 2003, p. 75). There is even the assertion that in the late 15<sup>th</sup> c. helmets were possessed by “almost everyone, ranging from the monarch to municipal guards” (Nowakowski 1994, p. 222). In this paper we would like to discuss the reasons for this opinion and some reservations with regard to that. In the late Middle Ages, in the peak period of the development of armour, the helmet became a complementary element in the whole armour, which was necessary during the battle. Its price seems to be the only limiting factor concerning its possession. Helmets used in the late 15<sup>th</sup> c. (close helmets, kettle-hats, sallets) had in fact a cheaper alternative in the form of a mail coif that safeguarded the head; however, not in such a way as the helmet did. On the other hand, it should be noted that the treatment of a mail coif as an alternative to the helmet is in fact not fully correct because it was often worn under the helmet to strengthen the protection of the head.

The popularity of wearing helmets seems to be evident when we look at iconographic sources. In 15<sup>th</sup> c. works of art from the area of Poland warriors are often portrayed with helmets on their heads. It applies to battle scenes in particular. On the depiction of the battle of Legnica in 1241 (the so-called Bernardine panels of about 1440) the Polish horsemen are portrayed in kettle-hats and helmets resembling tournament frog-mouthed helmets. On the other hand, in the miniature in the Codex of Anthony Hornig from 1451 the Polish cavalry at Legnica wear

both tournament helmets and archaic basinets with aventails (Żygulski jun. 1982, pp. 145–146, 1996, 1952–1956; Nowakowski 1990, p. 492, XI; Palińska, Miodońska 2004, pp. 428–429; Miodońska 2004a, p. 401; 2004b, p. 477, fig. 92; Ziomecka 2004a, pp. 227–228; 2004b, pp. 292–294; 2004c, p. 165, fig. 296). In another painting (c. 1481–1488), showing the capture of Marienburg by the Polish army in 1460, the Poles are depicted in full Gothic armours and sallets, basinets, kettle-hats and coifs (Szymczak 1994, p. 270; Kajzer, Kołodziejki, Salm 2001, p. 295; Labuda 2004b, p. 355; 2004c, pp. 424–426, fig. 795, 796; 2004d, p. 173). For the sake of comparison, it is worth mentioning a later work, i.e., the painting of “The Battle of Orsza” from about 1520. It shows the victory of the Polish-Lithuanian troops over the Muscovite army in 1514. The Poles are portrayed on horseback and to a lesser extent, as infantrymen. They wear Maximilian helmets, basinets and sallets, but also caps and hats (Herbst, Walicki 1949; 1933–1963; Żygulski jun. 1981; pp. 85–132; 1982, pp. 205–206; 1996, pp. 80–83).

In all these battle scenes, Polish fighters engaged in close combat are portrayed with the headwear in the form of a helmet, individually perhaps in the headgear made of organic material (caps, hats), which is especially evident in “The Battle of Orsza.” In this case, however, it is probably the result of the changes that occurred at the threshold of the Modern Period, including the introduction of firearms (cf. Szymczak 2003, pp. 275–278)

In addition to scenes of battle, helmets appear in many religious scenes, drawn from the Scripture. These are mainly Passion scenes, in which the subse-

quent stages of the Passion of Christ are accompanied by Roman soldiers. The weaponry depicted with the Romans was often subject to various types of distortions, such as archaism, Orientalisation, derision (see Żygulski jun. 1978; Chmielowiec 2003). Nevertheless, the helmets which were portrayed became the basis for identification of types of helmets used in late medieval Poland. The most reliable depictions include the scene of the *Gethsemane Prayer* from the triptych from Niedzica from around 1450–1455 (Kajzer 1976, fig. 39b-c; Nowakowski 1990, pp. 54, 516, fig. 76a; 2003, fig. 63a), scenes of the *Passion* from the Triptych of Ptazkowa from around 1430 (Kajzer 1976, fig. 38–39a; Nowakowski 1990, pp. 47, 520, fig. 80; Ławrynowicz 2009, p. 88, fig. 12) or the painting of the *Passion* in St. James's Church in Toruń from around 1480–1490 (Nowakowski 2003, fig. 75; Domasławski 2004, pp. 269–270; Labuda 2004b, pp. 354–358; 2004c, p. 426, fig. 798). Helmets often appear on soldiers' heads, for example in the scene of the *Conversion of St. Paul* in the Triptych of the Holy Trinity in Wawel Cathedral from about 1467 (Kajzer 1976, fig. 52; Nowakowski 1990, pp. 54, 519, fig. 79c; 2003, fig. 32; Gadomski 2004a, p. 275; Secomska 2004a, pp. 194–195). There appear both simple basinet, kettle-hats and sallets, but there are no such helmets as early great helmets (pot helmets) as an attribute of knights. The helmet is a rare element of depiction of martyr warrior saints, with the exception of depictions of St. George, for example, from the Triptych of Wielgomłynny in Central Poland from about 1460 (Kajzer 1976, fig. 42; 1990). St. George is also sometimes depicted with the diadem surmounted by a cross, as it is the case with the Triptych of the Holy Trinity in Wawel Cathedral. Due to the popularity of helmets in the New Testament scenes, they were treated as an obvious element of armour in 15<sup>th</sup> c. Poland.

The situation is different in the case of Gothic tombstones (Kajzer 1976, p. 129), where an effigy of a died person or an effigy of a knight representing the deceased person was portrayed with numerous attributes, where the presence of the helmet was not needed at all. The appearance of bare heads (and faces) on the tombstone demonstrated personal qualities of the deceased. In the 15<sup>th</sup> c. iconography of Polish helmets they can rarely be found on the heads of warriors and knights on tombstones and epitaphs. If they occur, they are usually situated at the feet of a knight or are shown as a heraldic element (also on the gravestones of women). The location of the helmet at the feet of the knight, as on the tombstone of Voivode Piotr Kmita in Wawel Cathedral

(1505) (Mrozowski 1994, p. 184, fig. I 33; Jarzewicz, Karłowska-Kamzowa, Trelińska 1998, pp. 80–82, fig. XI) is interpreted as a symbol of contempt for temporal matters. Ideally, it is demonstrated in epitaph scenes, whose function was to show the humility of a knight. One of many examples of this is the depiction of St. Stanisław (c. 1510–1515) from the Franciscan Church in Kraków, with the image of Paweł Czarny, the governor of Kraków salt mines (Kajzer 1976, p. 75, fig. 22; Nowakowski 1990, fig. 105b; Gadomski 2004a, p. 296; 2004b, p. 328, fig. 610; Secomska 2004b, p. 210). On the other hand, smaller depictions of knights with helmets on their heads formed part of the idea of readiness to fight in defence of faith and for heroic death. A good example is the depiction of Jan of Garbów from around 1454 with a drawn sword and his head being almost completely overshadowed by a deep kettle-hat (Mrozowski 1994, pp. 173–174; fig. 18; Ławrynowicz 2005, pp. 104–105). Concerning the images of rulers, the lack of helmets on their heads was related to the need to emphasise the importance of the insignia of power, such as the Royal crown or the ducal coronet. In many cases (such as Royal tombs) courtly conventions were also significant (Ławrynowicz 2005, pp. 101, 102). It does not apply to the Royal procession, where mounted knights are portrayed in helmets. It is very clearly visible on the murals in the Bridgettine Church in Lublin from about 1470 (Nowakowski 1990, pp. 56, 514, fig. 69; Karłowska-Kamzowa, 2004a, p. 107; 2004b, p. 80, fig. 130; Małkiewiczówna 2004, pp. 68–69).

In a brief review of iconography it is impossible to omit such depictions, where a helmet was replaced with civilian headgear. This phenomenon most often occurs in the scenes of hunting, for example, in the painting of King Władysław Jagiełło in a fresco in the Chapel at the Lublin Castle from around 1418 (Walicki 1930, pp. 22–24, fig. 141; Kajzer 1976; Różycka-Bryzek 2004, p. 168) and in the triptych of the Holy Trinity from about 1467 (Wawel Cathedral), where St. Eustace is depicted on the hunt in a hat (Nowakowski 2003, p. 76, fig. 32; Gadomski 2004a, p. 275; 2004b, p. 259, fig. 477; Secomska 2004a, p. 194–195; Ławrynowicz, Nowakowski 2009a).

These afore-mentioned features can also be seen on other categories of iconographic sources, such as depictions on stove tiles (Ławrynowicz, Nowakowski 2009b; 2009c).

As we can see, iconographic sources which are so often used for weaponry analysis, cannot be treated as decisive with regard to the degree of popularity

of wearing helmets, especially in the context of a battle.

The issue of using helmets during battles was also a matter of discussion by means of examination of bone remains from battle cemeteries. In the second half of the 15<sup>th</sup> c., there is a lack of a representative group of skeletal remains that could be given here as an example. Based on finds from the Battle of Grunwald, which are relatively close in terms of chronology, it can be noticed that effects of injuries (cuts, thrusts) discovered on some skulls show that they were inflicted at an exposed part of the body. It should be stressed, however, that researchers have not explicitly ruled out the possibility of breaking of weapons on a plate helmet or stun strikes. In spite of anthropological studies, it is unclear whether the buried persons were fighters, servants or local people involved in the battle turmoil (Łuczak 1991, pp. 106–144; 1996, pp 29–72). There is also a possibility that a strike at the fighter was delivered after the helmet had been destroyed or lost. Although anthropological studies of head injuries have got the cognitive potential, in practice we still do not have a sufficiently representative sample of this type of data to be able to draw firm conclusions (cf. Thordeman, Nolund, Ingelmark 1939; Łuczak, Głosek, Malinowski 1993; Kjellström 2005).

These research opportunities on the basis of archaeological, anthropological and iconographic sources allow us only to pose a prudent assumption that, indeed, not all warriors in the late Middle Ages wore helmets. Let us therefore look at written accounts.

Written relations, especially in the chronicles, provided that they contain any references to the protection of the head, occur in a particular context. Chroniclers describe the battle and stress occasions on which a helmet was found, removed or destroyed in the course of fighting. We have encountered no mention, however, in which the author would have taken care about the occurrence of warriors who fought without their helmets. On one hand, one could therefore say that helmets were worn by all combatants. On the other hand, that participation in the fight without a helmet was nothing special.

Based on written sources, the absence of a helmet in the military can be stated only if actual weapons were described as belonging to a particular warrior. Therefore, next to narrative sources, there is no use of lists of equipment stored in the arsenals of the nobility or towns, since we do not know exactly how many and what sets of weapons were completed. In the case of weaponry lists in the arse-

nals it is not known whether resources located there were supplemented with other reserves of equipment (see Żabiński 2013).

More specific details are known for location privileges, i.e., grants of rights and duties by sovereigns (kings, dukes, bishops, or noblemen) to settlements (villages or towns) (in Poland these legal patterns were mostly known as the German law). The duties of a village or town mayor included military service to the sovereign. The information recorded there included the equipment which was required for him in the event of war, the type of service (on foot or mounted) and its dimension. A difficulty in the analysis of these sources is that they were not written down according to a single pattern. Sometimes the duties of war were not mentioned, and sometimes there was only a concise remark that the mayor had to serve in the event of war. In 482 location charters from 1350–1450 there were references to military duties of mayors, mentioning the service with horses, crossbows or armours, but individual parts of equipment including helmets were mentioned in 39 cases only. These data would point to the fact that the participation of town and village mayors equipped with helmets was extremely small.

The most reliable sources in this respect are the lists of mercenary troops in the service of the Kings of Poland. The registers were drawn up by the officials representing the king. Their task was to determine whether the soldiers admitted to the service had proper weapons. The lists of soldiers and their equipment were written off just before the beginning of the war, or in its course. The official who recorded the register reviewed the detachment in person. The content of the register is therefore a result of his eyewitness observation. These inventories were the basis for payment of compensation to soldiers who had lost arms during the service. This means that for the equipment which was not registered the mercenary received no compensation. In the interest of the soldiers was then to be sure that the records accurately described their equipment. It should however be noted that in the records there were mercenary-arms which were generally omitted, probably because in the event of their loss no compensation was paid. In order to reduce fraud, the lists were prepared at least in duplicate. One copy was forwarded to the official leading royal accounts, the other the direct commander of the army (e.g. the hetman).

In comparative studies only those lists which mentioned various elements of weaponry could be taken into consideration. These sources inform i.a. about the popularity of various types of helmets

among mercenary troops. A comparison of the data contained in the lists of mercenary troops from 1471–1500 implies that sallets constituted 80% and kettle-hats – 16% of helmets worn by the infantry. The percentage of basinets (called *galea* in Latin) was 4%. It should be noted that among 7 000 of infantry soldiers only 368, i.e. slightly over 5%, had helmets.

Summary data on mercenary cavalry shows that the equipment of horsemen were mostly sallets (75%), with kettle-hats being less than 15%. Almost 5% of mentions concern basinets, which were referred to with an ambiguous term *galea*. However, more than 5% are found only in one detachment. These were *pekillhube* helmets, which are not fully identified yet. As it is known, there is only one mention of a close helmet, which is within the limits of statistical error. These data were obtained based on records concerning a detachment of 1140 horsemen. The register shows that in 1471 (concerning soldiers taking part in the expedition to Bohemia and Hungary) 38% of mercenary horsemen were without helmets, and in some other detachments the percentage reached even 70%. In the subsequent years the percentage of soldiers without helmets was smaller. In 1474 (the expedition to Silesia against Matthias Corvinus) it was 10%, with the data having been obtained from a relatively narrow source basis (70 soldiers). In 1477 (the “Priest War” in Prussia) there were 11% of soldiers without helmets (Grabarczyk 2000, pp.160–164). Interesting information is contained in a roll of captain (*rothmagister*) Alexander Sewer’s detachment (*rota, comitiva*). It was mobilised in 1498 for defence of southern Poland against the Turkish invasion. In Sewer’s detachment there were 76 cavalrymen, including 8 (10%) without helmets (Grabarczyk 2009, pp. 445–453) [see Plate 1].

None of these soldiers were mounted lancers with full plate armours. Three of them were crossbowmen, other 5 can be described as mounted lancers with no full plate armours (*semihastarius*) – soldiers whose primary weapon was a lance. They did not wear full cavalry armour, but only parts of it. Overall, in Sewer’s detachment there were 48 crossbowmen and 17 *semihastarii* with eight of them having no helmets. Let us look closer at the equipment of these soldiers. The value of these mercenary armours is not easy to estimate because it could vary a great deal, depending on whether the equipment was new or used. For the purpose of this paper, we assumed that the cost of used weapons was 50% of new ones. Therefore, the price of the equipment of individual horsemen could vary from 260 to 520 groschen for the least

equipped and from 330 to 660 groschen for the best equipped mercenaries in this detachment (30 groschen = 1 Hungarian florin = circa 160 g of silver). In this group there was a horseman, whose armament consisted only of armour and gauntlets, which could cost c. 170–340 groschen, i.e., less than the equipment of any other combatant. Its equipment, however, was deemed insufficient by the Royal official who inspected the detachment. The register reported that the soldier had to buy the rest of the weapons. It is possible that a helmet was also meant among them (*wsytek zbroye ma Krakowie dokupicz – he has to buy all armour in Kraków*). The equipment of other soldiers without helmets did not raise any objections of the Royal officials. The sums spent on weapons of mercenaries – especially when augmented with the cost of a crossbow, of other weapons, and of grooming a horse – show that these soldiers could afford to buy a helmet. In their case the lack of helmets was not the result of a dearth of money, but it was rather a conscious decision to abandon this part of armament.

Seeking for an answer to the question why some soldiers served without the protection of their heads, the economic aspect appears in the first place. For a poor candidate to serve in the infantry who had to spend about 60 groschen on his equipment, another 20 groschen spent on the helmet caused an increase by 1/3 in equipment costs. However, this may explain the small number of helmets used by poor infantrymen. The horsemen could afford to buy a helmet. They did not have it for other reasons than financial ones.

Perhaps for many veterans fighting without a helmet, despite the risk of injury, was regarded as more effective, for example, by the lack of restrictions in field of vision and increase of the reaction time. Although the iconography of the period in question depicts horsemen in armours and helmets, it is worth noting that in the 16<sup>th</sup> c. no-one would have been surprised to see a light cavalryman without a helmet. It should also be taken into account that the soldiers who were recorded in registers without helmets, could protect their heads with such fur hats which we know from 16<sup>th</sup> c. iconography depicting Hussars.

In weaponry studies we conduct research focused on searching for information about the types of weapons, keep track of changes in their structure, and we observe territorial and chronological occurrence of individual elements of medieval military equipment. While focusing on the equipment one can easily negate the fact that soldiers may have volun-



Tab. 1. Equipment of Alexander Sewer's soldiers who did not wear helmets (1498)

No	Weapons	Value (groschen)
1	breastplate, backplate, gauntlets, chainmail, gorget, crossbow	320–640
2	breastplate, backplate, gauntlets, vambrace, gorget, mail sleeves, skirt, tassets	335–670
3	breastplate, backplate, gauntlets, vambrace, gorget, mail sleeves, skirt, tassets	335–370
4	breastplate, backplate, gauntlets, vambrace, gorget, mail sleeves, skirt	310–620
5	breastplate, backplate, vambraces, gauntlets, mail, gorget, crossbow	370–740
6	breastplate, backplate, gauntlets, mail, gorget, crossbow	320–640
7	breastplate, backplate, gauntlets, mail, gorget, crossbow	290–580
8	gauntlets, mail	170–340*

\* Soldier must buy all armour in Kraków

Source: AGAD, Archiwum Skarbu Koronnego, Oddział 85, t. 3.

tarily resigned from some of its elements. Perhaps the absence of helmets – which seem to be essential part of the horseman's equipment – is a harbinger of changes that began to occur in the late Middle Ages in the cavalry armament. They led to the rejection of full plate armour in favour of lighter weapons, which gave the warrior a greater freedom of movements. In the case of the Polish army it was particularly important that at the turn of the 15<sup>th</sup> and 16<sup>th</sup> c. the

Polish troops had to fight light-armed adversaries. In this paper we would like to draw attention to the fact that we should not only examine the references to the various components of the weaponry, but also pay attention to missing features. It would be interesting to trace the occurrence of certain items of equipment on a scale of not just one country but across entire Europe.

## BIBLIOGRAPHY

### ARCHIVAL SOURCES

AGAD – Archiwum Akt Dawnych w Warszawie, Archiwum Skarbu Koronnego, Oddział 85, t. 1–4.

### SCHOLARSHIP:

Chmielowiec S.

2003 *Przedstawienia tzw. „zbroi szyderczej” w ikonografii średniowiecznej z terenu Małopolski*, unpublished MA thesis, Institute of Archaeology, University of Łódź.

Domasłowski J.

2004 *Toruń. Obraz Pasja*, (in:) A.S. Labuda, K. Secomska, (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, pp. 269–270.

Gadomski J.

2004a *Malarstwo tablicowe w Małopolsce*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 251–305.  
2004b *Malarstwo tablicowe – Małopolska*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 3: Album ilustracji, Warszawa, pp. 209–358.

Grabarczyk T.

2000 *Piechota zaciężna Królestwa Polskiego w XV wieku*, Łódź.  
2009 *Uzbrojenie w konnej rocie Aleksandra Sewera z 1498 roku*, *Archaeologia Historica*, Vol. 34, pp. 445–453.

Grabarczyk T., Ławrynowicz O.

2009 *Kapaliny w późnośredniowiecznej Polsce*, (in:) E. N. Nosov, S. W. Beleckij (eds.), *Краеугольный камень. Археология, история, искусство, культура России и сопредельных стран*, Moskva, pp. 230–240.

Herbst S., Walicki M.,

1949 *Obraz bitwy pod Orszą. Dokument historii i wojskowości XVI w.*, *Rozprawy Komisji Historii Sztuki i Kultury*, Vol. 1, Warszawa, pp. 33–63.

Jarzewicz J., Karłowska-Kamzowa A., Trelińska B.

1998 *Gotyckie spiżowe płyty nagrobne w Polsce*, Poznań.

Kjellstrom A.

2005 *A Sixteenth-Century Warrior Grave from Uppsala, Sweden: the Battle of Good Friday*, *International Journal of Osteoarchaeology*, Vol. 15, pp. 23–50.

Kajzer L.

1976 *Uzbrojenie i ubiór rycerski w średniowiecznej Małopolsce w świetle źródeł ikonograficznych*, Wrocław.

Kajzer L., Kołodziejki S., Salm J.

2001 *Leksykon zamków w Polsce*, Warszawa.

Karłowska-Kamzowa A.

2004a *Malarstwo ściennie w Małopolsce*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 93–110.  
2004b *Malarstwo ściennie – Małopolska*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 3: Album ilustracji, Warszawa, pp. 55–92.

Labuda A. S.

2004a *Malarstwo tablicowe w Wielkopolsce, na Kujawach i Mazowszu*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 307–332.  
2004b *Malarstwo tablicowe na Pomorzu Wschodnim*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 333–361.

- 2004c *Malarstwo tablicowe – Pomorze*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 3: Album ilustracji, Warszawa, pp. 391–440.
- 2004d *Gdańsk. Oblężenie Malborka*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, p. 173.
- Ławrynowicz O.
- 2005 *Treści ideowe broni rycerskiej w Polsce wieków średnich*, *Acta Archaeologica Lodziensia*, Vol. 51.
- 2009 *Nowo odkryty kapalin z Włocławka na tle porównawczym*, *Acta Militaria Mediaevalia*, Vol. 5, 175–195.
- Ławrynowicz O., Nowakowski P.A.
- 2009a *Hunting Arms and Equipment in Medieval Iconography*, *Fasciculi Archaeologiae Historicae*, Vol. 22, pp. 1–10.
- 2009b *Średniowieczne kaski jako źródło poznania uzbrojenia*, (in:) P. Kucypera, P. Pudło, G. Babiński (eds.), *Arma et Medium Aevum. Studia nad uzbrojeniem średniowiecznym*, Toruń, pp. 116–140.
- 2009c *Stove tiles as a source of knowledge about mediaeval and Early Modern arms and armour*, *Studies in Post-Medieval Archaeology*, Vol. 3, pp. 303–316.
- Łuczak B.
- 1991 *Ludzkie szczątki z Pól Grunwaldu*, *Studia Grunwaldzkie*, Vol. 1, pp. 106–144.
- 1996 *Antropologiczne źródła informacji historycznej*, Łódź.
- Łuczak B., Głosek M., Malinowski A.
- 1993 *Rany pourazowe jako źródło informacji historycznej*, (in:) *Człowiek w czasie i przestrzeni*, Gdańsk, pp. 391–395.
- Małkiewiczówna H.
- 2004 *Lublin. Malowidła w korpusie nawowym*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, pp. 68–69.
- Miodońska B.
- 2004a *Śląskie malarstwo książkowe*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 377–412.
- 2004b *Malarstwo książkowe – Śląsk*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 3: Album ilustracji, Warszawa, pp. 433–492.
- Mrozowski P.
- 1994 *Polskie nagrobki gotyckie*, Warszawa.
- Nowakowski A.
- 1990 *Uzbrojenie ochronne*, (in:) A. Nadolski (ed.), *Uzbrojenie w Polsce średniowiecznej 1350–1450*, Łódź, pp. 31–110.
- 1994 *Oporządzenie indywidualne*, (in:) A. Nadolski (ed.), *Polska technika wojskowa do 1500 roku*, Part 3, Warszawa, pp. 249–254.
- 2003 *Uzbrojenie ochronne*, (in:) A. Nowakowski (ed.), *Uzbrojenie w Polsce średniowiecznej 1450–1500*, Toruń, pp. 75–108.
- Palińska A., Miodońska B.
- 2004 *Legenda obrazowa św. Jadwigi śląskiej zwana Legendą wrocławską lub Legendą Horniga*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Katalog zabytków, Warszawa, pp. 428–429.
- Różycka-Bryzek A.
- 2004 *Malowidła ścienne bizantyńsko-ruskie*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 155–184.
- Secomska K.
- 2004a *Kraków. Tryptyk Trójcy Świętej*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, pp. 194–195.
- 2004b *Kraków. Obraz Św. Stanisław*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, p. 210.
- Szymczak J.
- 1994 *Sprzęt i technika oblężnicza*, (in:) A. Nadolski (ed.), *Polska technika wojskowa do 1500 roku*, Part 3, Warszawa, pp. 257–270.
- 2003 *Początki broni palnej w Polsce (1383–1533)*, Łódź.
- Thordeman B., Nolund P., Ingelmark Bo E.
- 1939 *Armour of the Battle of Wisby*, Stockholm.
- Walicki M.
- 1930 *Malowidła ścienne kościoła Św. Trójcy na zamku w Lublinie (1418)*, *Studia do Dziejów Sztuki Polskiej*, Vol. 3, pp. 1–91.
- Ziomecka A.
- 2004a *Malarstwo tablicowe na Śląsku*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 1: Synteza, Warszawa, pp. 215–149.
- 2004b *Tryptyk św. Jadwigi*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 2: Katalog zabytków, Warszawa, pp. 292–294.
- 2004c *Malarstwo tablicowe – Śląsk*, (in:) A. S. Labuda, K. Secomska (eds.), *Malarstwo gotyckie w Polsce*, Vol. 3: Album ilustracji, Warszawa, pp. 139–208.
- Żabiński G.
- 2013 *Das Grosse Ämterbuch des Deutschen Ordens – Remarks on its value for arms and armour research* (in this volume).
- Żygulski Z. (jun.)
- 1978 *Średniowieczna zbroja szyderska*, (in:) P. Skubiszewski (ed.), *Sztuka i ideologia XV wieku*, Warszawa, pp. 587–607.
- 1981 *„Bitwa pod Orszą” – struktura obrazu*, *Rocznik Historii Sztuki*, Vol. 12, pp. 85–132.
- 1982 *Broń w dawnej Polsce na tle uzbrojenia Europy i Bliskiego Wschodu*, Warszawa.
- 1996 *Ślawne bitwy w sztuce*, Warszawa.

WITH OR WITHOUT A HELMET. SOME REMARKS ON EQUIPMENT ANALYSIS...

Tadeusz Grabarczyk, Ph.D.  
University of Łódź  
Institute of History  
Chair of History of Medieval Poland  
*27a Kamińskiego St.*  
90-219 Łódź, Poland  
tadeuszg@uni.lodz.pl

Olgierd Ławrynowicz, Ph.D  
University of Łódź  
Chair of Weapon Studies  
3 Uniwersytecka St.  
90-137 Łódź, Poland  
olgierdlawrynowicz@uni.lodz.pl