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THE CROSSBOW — THE WEAPON OF THE INVADERS AND THE DEFENDERS OF VILNIUS CASTLE (THE LATE 14TH – EARLY 15TH CENTURIES)

Missile weapons were despised by knights and widely deemed dishonourable. Therefore while recording the deeds of their clients, the chroniclers, who directly described fights in Lithuania, paid little attention to the virtues of shooters of humble origin. More comprehensive information about the crossbow used in wars against the Lithuanians can be derived from inventories of Teutonic Knights' castles, which contain a number of peculiarities of the historical development of Lithuania as well of other outlying areas of this European cultural region. Here the data from written sources are complementary to the information obtained during archaeological excavations.

In the Western European wars of the 14th–15th centuries, the crossbow competed with the longbow (or the English longbow). Despite the positive qualities of the longbow, in Continental Europe, crossbows gained in popularity, because long training was unnecessary to learn how to work them. During assaults on castles and towns and while defending them, a crossbow could be drawn and held in tension for a relatively long time.

The great battles of the Hundred Years' War at Crecy (1346) and Poitiers (1356) showed the advantages of the longbow as early as the mid — 14th century. This, in turn, resulted in the improvement of the crossbow. The longbow was a weapon requiring high-level professional skills, which was the reason why it did not entrench in Continental Europe, where it was in use to a lesser extent. By the turn of the 14th century, the improvement of crossbow construction had reached its peak. In the 15th century, the horn (component) bow was replaced with a steel one. In Eastern and Central Europe, crossbows with steel bows began to be used rather late. In Lithuania and seemingly in Germany as well as in northern territories, the horn crossbow reflex bow, which appeared in the 14th century, was subsequently replaced with a steel one. However, steel bows would break in winter time, whereas those made from birch bark and horn plates glued together were substantially more cold-proof. Like weapons with steel bows, crossbows with strong horn (component) bows, were windlass-driven (Fig. 1). Operation of the crossbow with a steel bow was slower. The replacement of the crossbows with horn (component) bows by devices with steel bows was due to the simplification of production. Finally, before the mid — 15th century, the steel crossbow "won" at the grand master's headquarters, as it started to be used for awarding guests[1].

In the 1360s, the war with the Order reached a new level. At the beginning of the 1360s, the destruction of the strategically important Old Kaunas Castle in 1362 became sort of a starting point[2]. The following year, the strategically important Pieštvė Castle, opening the Nemunas defence system, was seized[3]. One year later, in 1364, the undefended Pieštvė Castle was burnt down never to be rebuilt. The complex of Veliuona castles did not withstand the offensive either[4]. In1365,

[1] S. Ekdahl, *Die Armbrust im Deutschordensland Preussen zu Beginn des 15 Jahrhunderts*, [in:] "Fasciculi Archaeologiae Historicae", Fasc. V, Łódź 1992, pp. 17–48, 21.

[2] V. Marburgietis, *Naujoji Prūsijos kronika*, Vilnius 1999, pp. 114–119, 230–237; Hermanas iš Vartbergės, *Livonijos kronika*, [in:] *Livonijos kronikos*, Vilnius 1991, pp. 153–208, 186; *Franciscani Thorunensis Annales Prussici, Die Chronik Detmar's von Lübeck, Johann's von Posilge, Officials von Pomesanien, Chronik des Landes Preussen (von 1360 an, fortgesetzt bis 1419)*, „Scriptores rerum Prussicarum", Bd. 3, Leipzig 1886, pp. 57–388, 81, 82.

[3] V. Marburgietis, *Naujoji Prūsijos...*, p. 120; Hermanas iš Vartbergės, *Livonijos kronika...*, p. 187.

[4] *Ibidem...*, pp. 126–128, 237, 238; Ibidem..., p. 187.

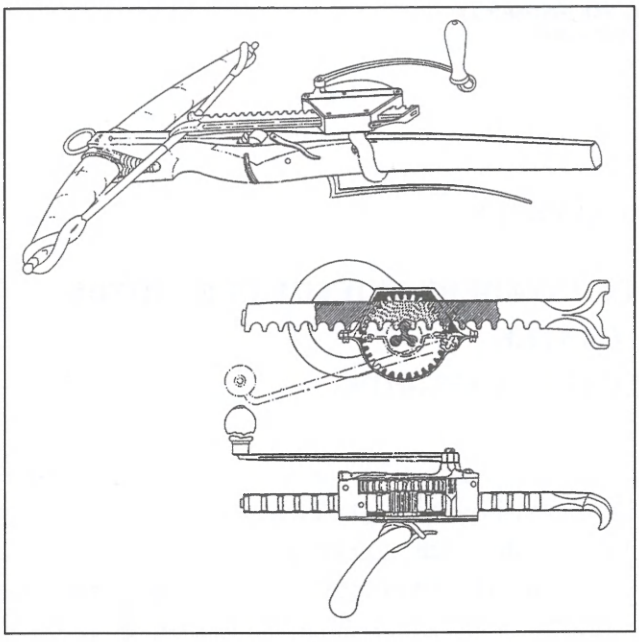

Fig. 1. Central European crossbow with horn bow and racket winder (cranequin, German winder), end of the 15th century.

the Order's troops, led by grand master Wynrich von Kniprode and the son of Duke Kęstutis, Butautas (Heinrich), reached Vilnius Castle for the first time[5]. The most recent Lithuanian historiography tends to adopt the viewpoint formulated by Theodor Hirsch as early as the 19th century that Vilnius Castle was not under siege that year[6]. In the 1360s, the Order's military power still did not pose a direct threat to the complex of Vilnius castles. However, the year 1367 was fatal for the defence system of Nemunas castles. Being beyond hope of defending the fortress against the enemy troops, the defenders of Veliuona Castle burned the castle down. Wooden Veliuona Castle was never rebuilt and, therefore, there is no mention of it in the Order's chronicles[7].

In the last quarter of the 14th century, the offensives of 1375, 1377, 1383, 1390 and 1394 against Vilnius Castle were the "spike" of all military campaigns of the Crusaders[8]. As early as the 1380s, the Crusaders' scouts were perfectly familiar with the roads to Vilnius[9]. During the siege of Vilnius in 1383, a brother from the Order was mortally pierced by an arrow and another one wounded. In 1390, the son of Kęstutis, knight Tautvila Konradas, died from an arrow wound near Vilnius Castle. Wigand compared the arrows cast from the towers of Vilnius Castle by the shooters of Vytautas' troops in 1394 to a hive. During the attack on Vilnius that year, the arrows of GDL shooters, certainly armed with crossbows, pierced the armour of French riders' horses; Later, they shot crossbow bolts at the Commander of Brandenburg, Johanh von Streifen, inspecting the guards, threw stones and arrows at the enemy. Finally, Wigand asserts that the Christians, having suffered severely from the bolts, were forced to retreat[10]. The most acclaimed freelance shooters from continental Europe were crossbowmen from Genoa. According to the written sources of the Teutonic Knights, many crusader shooters were of Bohemian and Silesian descent. The smallest unit of shooters was referred to as a spear — *Spieß*, or *Gleve*. A spear consisted of a fully armed commander, a crossbowman and an armour bearer — *Junge*. It was also comprised of four horses, one of which was led loose[11]. Although no reliable information about the shooters from *Genewel* mentioned by Wigand (others believe them to have been from Geneva), can be found in historiography, it is very likely that during the siege of Vilnius in 1394, crossbowmen from Genoa, considered as the best in contemporary Europe, fought on the side of the Order[12].

If we were to assess information provided by chroniclers about the shooters' arms, the most eloquent author would be the priest of Westphalia, Herman Wartberg. For him, either the Order's shooters or losses inflicted by enemy shooters simply did not exist[13].

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[5] V. Marburgietis, *Naujoji Prūsijos...*, p. 131.

[6] *Ibidem ...*, p. 302; *Die Chronik Wigands von Marburg*, „Scriptores rerum Prussicarum", Bd. 2, Leipzig, 1863, pp. 453–662, 552.

[7] R. Batūra, *Veliuona — Lietuvos gynybos skydas kare su Kryžiuočių ordinu (XIII a. pabaiga — XV a. pirmasis ketvirtis*, [in:] *Veliuona*, Vilnius 2001, pp. 78–111, 103.

[8] V. Marburgietis, *Naujoji Prūsijos...*, pp. 151, 156, 185, 199, 211–214; Hermanas iš Vartbergės, *Livonijos kronika...*, p. 205; *Franciscani Thorunensis...*, pp. 84, 104, 105, 127, 164–166, 194, 195.

[9] *Kraštas ir žmonės. Lietuvos geografiniai ir etnografiniai aprašymai (XIV–XIX a.)*, J. Jurginis and A. Šidlauskas, ed., Vilnius 1988, pp. 30–32; *Die littauischen Wegeberichte*, Nos. 66, 67, 70–72.

[10] V. Marburgietis, *Naujoji Prūsijos...*, pp. 185, 199, 209, 211–214.

[11] S. Ekdahl, *Die Armbrust im Deutschordensland...*, p. 32.

[12] V. Marburgietis, *Naujoji Prūsijos...*, pp. 208–209, 211, 214, 378; explanation 163: 3.

[13] Hermanas iš Vartbergės, *Livonijos kronika...*

In the early 15th century, after another unsuccessful attack on Vilnius Castle, launched in1402, the Teutonic troops moved as far as to approach Medininkai Castle for the last time[14].

The most recent Lithuanian historiography has quite detailed information about component parts of crossbows[15]. We can establish all parts of crossbows related to Vilnius Castle and a number of those directly connected with attacks on Vilnius Castle in the late 14th and the early 15th century.

A relatively short time ago, attention was paid to some unidentified articles made of horn or bone — arrow-groove plates — from Upper Vilnius Castle and its fortified bailey, called Lower Castle, as well as from the unfortified (?) approaches to this fortress (*suburbium, Vorburg*) (Fig. 2; Fig. 3)[16].

The author of a monograph about the excavations in Brest considers fragments of horn plates found together with other parts of a crossbow to be parts of a reflex bow or parts of a crossbow[17]. At least one of the plates found in Brest is undoubtedly an arrow-groove plate[18]. During the recent excavations at Ventspils Castle, an arrow-groove plate (*bultas turētājs*) was found in a complete state of preservation. The author of the investigations established the place of its fastening in the front of the crossbow stock — between the bow and the nut (the part of the trigger lever holding the bowstring) (Fig. 2). During previous archaeological excavations in the territory of Latvia, such crossbow elements had not been found[19]. Tomasz Wojciechowski examined the remains of crossbows found in the territory of Poland. Fragments of two plates are known from the archaeological works in Pułtusk[20]. Three relatively well preserved fragments of arrow-groove plates were discovered during the archaeological excavations of Czech and Moravian castles[21].

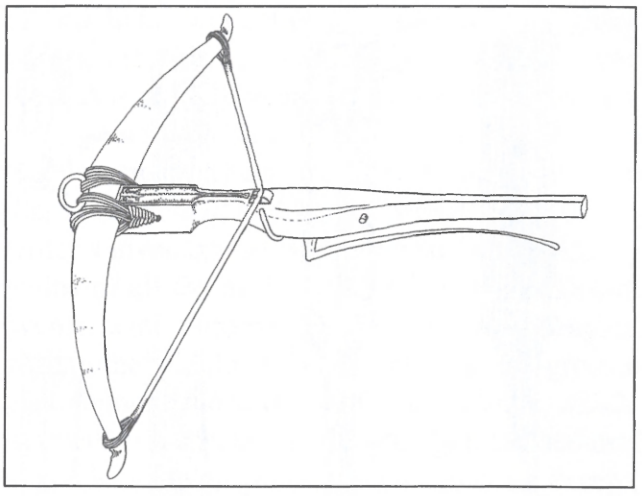

Fig. 2. Crossbow with arrow-groove plate (reconstruction).

Undoubtedly, a horn plate and a fragment of such a plate found during excavations at Vilnius Upper Castle are arrow-groove plates (Fig. 3: 1, 2). A fragment of an arrow-groove plate found at Vilnius Upper Castle comes from layer 5b, dated at the second half of the 14th — the early 15th century (Fig. 3: 2)[22]. Another analogously-shaped horn plate was found in layer 4b, dated at the 15th–16th century (Fig. 3: 1)[23]. Of course, it is not to be directly associated with the attacks on Vilnius Castle launched in the late 14th — the early 15th centuries. The chronology established by the investigators of Vilnius Upper Castle, Włodzimierz Hołubowicz and Helena Cehak-Hołubowiczowa, has indirectly been confirmed by the most recent discoveries of household ceramics[24].

[14] *Franciscani Thorunensis...*, pp. 258, 259.

[15] G. Rackevičius, *Arbaleto strėlės laikikliai iš Vilniaus pilies*, „Lietuvos archeologija", Vol. 21, Vilnius 2001. pp. 375–382; G. Rackevičius, *Arbaletų dirbtuvės Vilniuje (XIV a. II pusė — XV a. I pusė)*, „Lietuvos archeologija", Vol. 18, Vilnius 1999, pp. 175–183; G. Rackevičius, *Arbaletas ir lankas Lietuvoje XIII–XVI a.*, Vilnius 2002.

[16] G. Rackevičius, *Arbaleto strėlėsi...*, pp. 376, 376, figs. 1, 2 .

[17] P. F. Lysenko, *Bereste*, Minsk 1985, p. 283.

[18] *Ibidem*, p. 283, fig. 194: 12.

[19] M. Lūsēns, *Arheoloģiskie pētījumi Ventspilī*, [in:] *Arheologu pētījumi Latvijā 1998. un 1999. gadā*, Rīga 2000, pp. 156–168, 160, 161, fig. 3; M. Lūsēns, *Arheoloģiskie pētījumi Ventspils pilī*, [in:] *Ventspils Muzeja raksti*, Rīga 2004, pp. Vol. 4, pp. 19–106, 71, fig. 1: 5.

[20] T. Wojciechowski, *Znaleziska fragmentów kusz na ziemiach polskich* (*Fragments of Arbalests Found in Polish Lands*), „Kwartalnik historii kultury materialnej", XXXVII, Nos. 3–4, Warszawa 1989, pp. 481–496, p. 493, figs. 8: 2, 3.

[21] T. Durdík, *Kostěné obložení sochy kuše v českých a moravských nálezech*, „Archeologické rozhledy", Vol. 25, Fasc. 3, Praha 1973, pp. 344, 355, p. 345, figs. 1: 1–3.

[22] V. and E. Holubovičiai, *Gedimino kalno Vilniuje 1940 m. kasinėjimų pranešimas*, [in:] *Lietuvos praeitis*. Vol. 1, Fasc. 2, Vilnius–Kaunas 1941, pp. 649–691, pp. 669, 670, 688, 689, tables 6: 6, 11.

[23] *Ibidem*, pp. 675, 676, 688, 689, table 6: 6.

[24] G. Vaitkevičius, *Vilniaus buitinė keramika (14–17a.) Daktaro disertacija. Humanitariniai mokslai, istorija (05 H)*, Vilnius 1999, [in:] ALH, Fasc. 6, No. 58, pp. 23, 31.

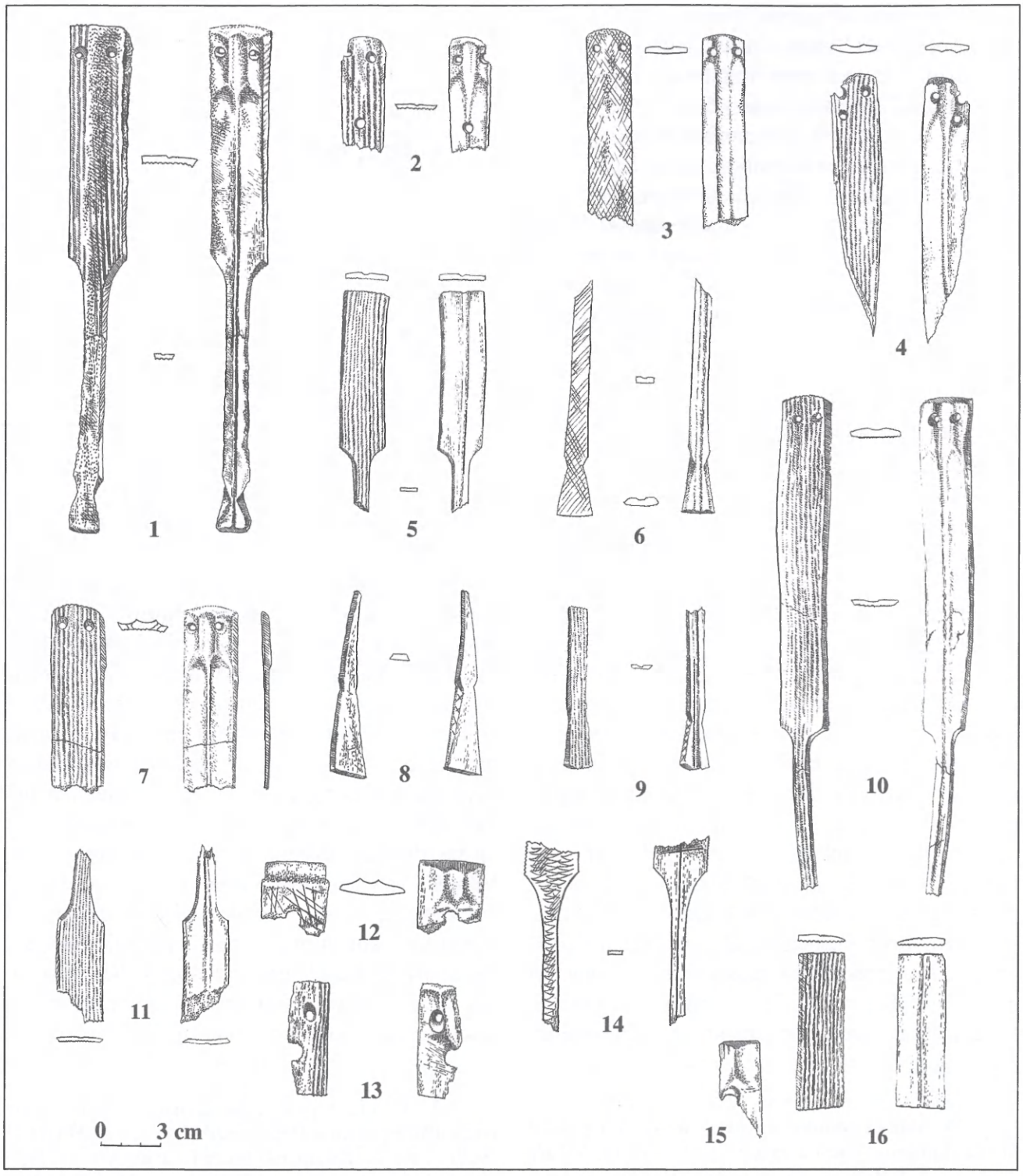

Fig. 3. Arrow-groove plates, second half of the 14th — first half of the 16th century.

Several fragments of arrow-groove plates coming from the excavations conducted on the castle hill in 1982 are kept in the National Museum of Lithuania. The circumstances of their discovery remain unclear, as no report on the investigations has been published (Fig. 3: 3–6). If the assumption that the arrow-groove plates were found in the same layer as some Prague groats is correct, they can be dated at the late 14th — the first half of the 15th century. Regrettably, all efforts to gain more information about the circumstances of the discovery of these crossbow parts have been unsuccessful.

According to written sources, the assaults against the Vilnius castles launched in the fourth quarter of the 14th and the early 15th century were unsuccessful, hence it is unlikely that an invader broke his crossbow at the most defended point of

the Vilnius Castle. It is much more likely that it is a fraction of a crossbow of a shooter who had taken up his position on the hill which protected the castle. An arrow-groove plate found in a later layer was obviously part a crossbow prepared for the defence of the castle.

A fraction of an arrow-groove plate found in the territory of Vilnius Lower Castle at the northern foot of the castle hill must have been thrown away as useless in the 15th century (Fig. 3: 7)[25]. In 2002 and 2003, implementing the project for the restoration of the Palace of the Kings of Poland and Grand Dukes of Lithuania, fractions of four arrow-groove plates, dated at the late 14th — the early 15th century, were found at the western foot of the castle hill (Fig. 3: 8–11)[26]. They can be directly related to the assaults on the Vilnius Castle, a mention of which was made in written sources.

Fractions of the arrow-groove plates found in a former crossbow workshop at Vilnius Castle date from the second half of the 14th — the first part of the 15th century (Fig. 3: 12–16)[27].

Despite the relatively small amount of archaeological material discussed here, it is important to draw attention to some typological differences between the remains of particular arrow-groove plates. Originally, some of the plates had three little holes for additional fastening made in their front part (Fig. 3: 2, 4, 13), some of them had two (Fig. 3: 1, 3, 7, 10), others — one opening (Fig. 3: 12, 15). The carving on their inner surface is different as well: some of the surfaces are covered with diagonal, intersecting lines (Fig. 3: 3, 6, 12, 15), one surface has a zigzag pattern (Fig. 3: 14), others have longitudinal notches carved on them (Fig. 3: 1, 2, 4, 5, 7, 9–11, 13, 16). The longitudinal notches are substantially deeper than the carved lines. A common external feature of all arrow-groove plates is that their side surface has diagonal lines carved on it.

In order to enlarge the opening, the inner surface of arrow-groove plates and their sides were carved. In the production of crossbow bows, glues of organic origin, particularly fish glue, were used. Assumingly, bone arrow-groove plates too were glued with similar glue to the front of the wooden stock. There had been mentions of fish files (*Fischfeilen*) and kettles (*Fischkessel*) in the Order's inventories[28]. The outer surface of the remains of all the arrow-groove plates is polished evenly, with a groove for the bolt carved lengthwise in the middle. A fraction of an arrow-groove plate found in the territory of Lower Castle, which has neither a carving on the glued on surface nor a groove made lengthwise, seems to be an exception (Fig. 3: 8)[29]. Perhaps, it is another hint that a non localised place of crossbow production existed at Lower Castle.

A fraction of an arrow-groove plate found in the late 14th — the early 15th century Lower Castle layer is 255 mm in length (Fig. 3: 10). It may be suggestive of an earlier, more transformable, i.e. weaker, crossbow bow. In the context of a wider region, it is only possible to compare the lengths of two arrow-groove plates in a full state of preservation, coming from the 15th–16th century layers of Vilnius and Ventspils castles. Both the arrow-groove plates are equal in length — 260 mm (Fig. 3: 1)[30]. The plates' length indirectly suggests that rather short bolts were used at that time. The reflex (component) or steel bows of military crossbows of the late 14th–16th century were windlass-driven (*Winde*). In the Order's written sources, such crossbows were referred to as *Windearmbrost*[31]. When drawn, such strong bows were deformed to a minor extent; hence the bolts used were relatively short.

An arrow-groove plate from Vilnius Castle in a complete state of preservation and fractions of ten plates were 27, 20, 22, 23, 22, 26, 24, 23, 33, 28, and 24 mm wide at their widest points (Fig. 3: 1–5, 7, 10–12, 14, 16). The fractions of an arrow-groove plate from Brest are 30 mm wide at their

[25] G. Rackevičius, *Arbaleto strėlės...*, p. 378.

[26] E. Ožalas, *Vilniaus žemutinės pilies Valdovų rūmų teritorija. Pietinio korpuso prieigų 2003 m. archeologinių tyrimų ataskaita*. Vols. 1–5, Vilnius 2004, [in:] ALH, Fasc. 1, Nos. 4251–4255, Vol. 1, pp. 52, 81, 82, Vol. 2, pp. 174, 205, photos Nos. 351–353, fig. 141–143, 146, Vol. 4, pp. 234–236, Nos. 21, 25, 26, 44.

[27] G. Rackevičius, *Arbaletų dirbtuvės...*, p. 178.

[28] S. Ekdahl, *Die Armbrust im Deutschordensland...*, p. 24.

[29] E. Ožalas, *Vilniaus žemutinės pilies...*, Vol. 1, p. 81, Vol. 2, p. 205, fig.146, Vol. 4, p. 236, No. 44.

[30] M. Lūsēns, *Arheoloēiskie pētījumi Ventspilī...*, p. 161, fig. 3.

[31] A. Nadolski, M. Lewandowski, *Broń strzelcza*, [in:] *Uzbrojenie w Polsce średniowiecznej 1350–1450* (*Missile Weapons. Arms and Armour in Medieval Poland 1350–1450*) Łódź 1990, pp. 143–153, 151.

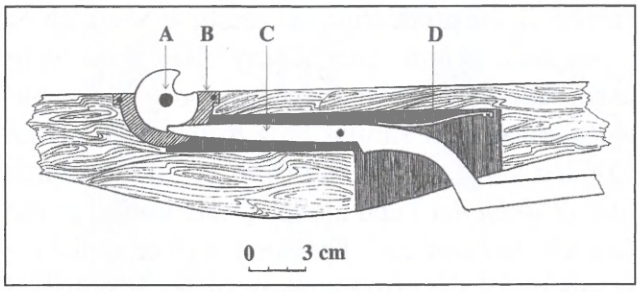

Fig. 4. Crossbow lock and trigger with spring. Reconstruction after the Schnitzhaus of Vilnius.

widest point[32]. An arrow-groove plate found in the Order territory is also 30 mm wide[33]. The plate's width is always lesser than the stock's width at the place of its fastening. As stated above, an arrow-groove plate was fastened to the stock between the bow and the nut. The front part of the stock beside the bow (because of the fastening of the bow) and the central part beside the nut (because of the fastening of the lock and trigger) are always bigger in width. The shape of a crossbow arrow-groove plate would resemble that of a lightweight stock, i.e. those parts of the stock that did not carry additional mechanical load, were narrowed to the maximum (Fig. 2).

During the excavations of castles, the most often found items are parts of the crossbow lock mechanism (Fig. 4). In the regional context, fragments of the so-called nuts seem to be best known. In German written sources, this part of the lock and trigger is referred to as the *Nuß* (Fig. 4: A). As far back as the 11th–12th centuries, the strings of the crossbows used during the Crusades in Palestine were held in a stretched position by the crossbow nut[34]. They used to be made of antlers and hence, due to the fact that they were easily worn out and the spongy structure of the horn as well as other reasons, these parts would break. According to the data of 1409, in the workshop of Marienburg (Malbork) 27 antler crowns had been used for the production of crossbow nuts[35].

Broken crossbow nuts were discovered during the excavations at Vilnius Lower Castle (Fig. 5: 1–4)[36]. These fragments of nuts were 36, 42, 32, 37 mm in diametre, and the two of tem which were in a better state of better preservation were 34 and 21 mm wide. One of the crossbow nuts discovered at Vilnius Lower Castle has a metal bar parallel to the threaded hole of the nut (the axis around which the nut would turn while triggering the string). Perhaps, it prevented the device from being accidentally triggered. It is known that in the 16th century, crossbow safety catches were not fixed to the nut but the trigger (Fig. 5: 1). On the basis of the first Lithuanian coins, crossbow bolt heads found together with them as well as their stratigraphical position in the upper part of the peat layer, these nut fragments can be dated quite precisely to the late 14th —the early 15th century.

The horn articles produced at the Vilnius crossbow workshop just 200 metres south of the castle gate are connected with crossbow production. The workshop not only produced new crossbows but also technologically improved older models and fixed the damaged ones[37]. In the workshop, broken crossbow nuts unsuitable for further use were replaced by new ones. During the archaeological excavations in Pilies Street, four fragments of nuts 37, 38, 39 and 40 mm in diameter dated at the second half of the 14th — the first part of the 15th century were found. Also, in Šv. Mykolo (St Michael's) Street, four fragments of crossbow nuts 37, 40 and 31 mm in diameter, dating from the first half of the 15th century at the latest, were discovered (Fig. 5: 5–11). The width of only one crossbow nut found on the approaches to the Vilnius Castle can be established approximately. It was about 21 mm wide (Fig. 5: 9).

One nut was found in Belarus during the excavations at Grodno Castle in the upper 14th century layers[38]. At the same time socketed and tanged bolt heads were found, which can be associated with the assaults on Grodno Castle of the second

[32] P. F. Lysenko, *Bereste...*, p. 283, fig. 194: 12.

[33] M. Lūsēns, *Arheoloēiskie pētījumī...*, p. 161, fig. 3.

[34] S. Ekdahl, *Die Armbrust im Deutschordensland...*, p. 19.

[35] *Ibidem*, p. 25.

[36] A. Kuncevičius, A. Tautavičius, V. Urbanavičius, *Vilniaus Ţemutinės pilies rūmų teritorijos tyrimai 1992 metais*, Vilnius 1993, [in:] ALH, Fasc. 1, No. 2021a, b, list of finds Nos. 2366, 3305; G. Striška, *Vilniaus žemutinės pilies Valdovų rūmų teritorija. Rytinio ir šiaurinio korpusų prieigų 2003, 2004 m. archeologinių tyrimų ataskaita*. Vilnius 2005, [in] CRC No 348, list of finds No. 4874; E. Ožalas, *Vilniaus žemutinės...*, Vol. 1, p. 78, Vol. 2, p. 174, 205, photo No. 349, fig. 144, Vol. 4, p. 234, No. 19.

[37] S. Ekdahl, *Die Armbrust im Deutschordensland...*, pp. 27, 28.

[38] N. N. Voronin, *Drevneye Grodno (po materialam arkheologhicheskhikh reskopok 1932–1949 gg.)*, [in:] „Materialy i isledovanya po arkheologhiy", SSR, *No. 41*. Moskva 1954, p. 166, fig. 88: 18.

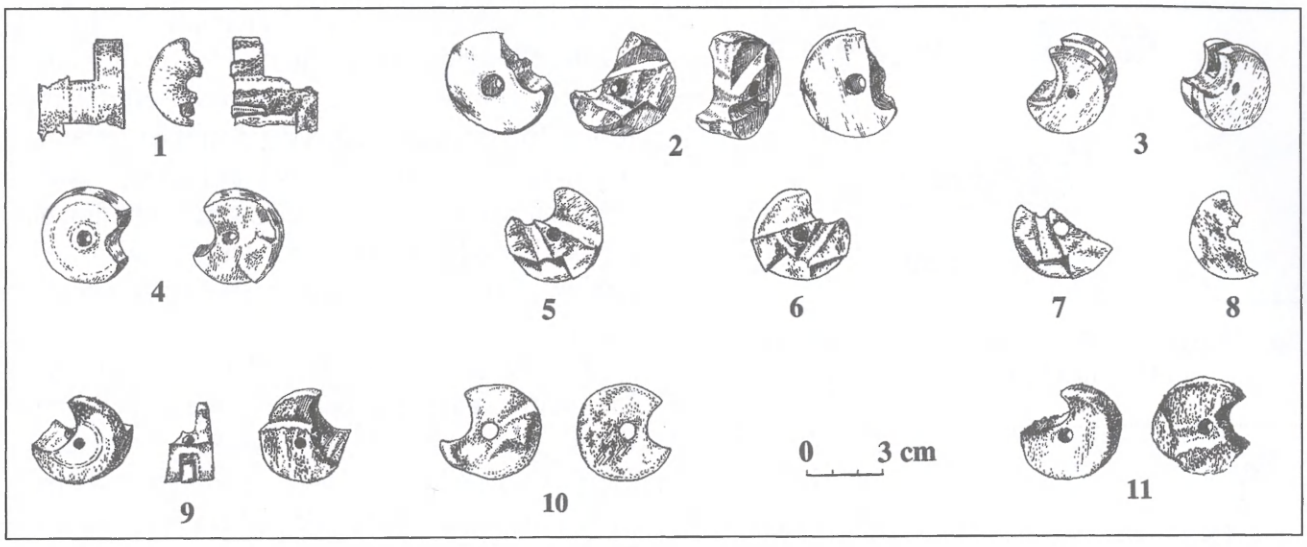

Fig. 5. Fragments of crossbow nuts, second half of the 14th — first half of the 15th century.

part of the 14th century. The author of the investigations points out that a crossbow nut was also found in Surazh[39]. During the excavations in Brest, in the 15th century layers, two crossbow nuts and a fragment of a third one were found[40]. The nuts found in Brest were 40–55 mm in diametre and 20–25 mm wide[41]. I guess that the bigger portion of the crossbow fragments found in the territory of the Grand Duchy of Lithuania (GDL) in the 14th–15th centuries are related to the guards of Lithuanian castles and their servicing.

One of the first crossbow nuts found in Latvian territory comes from the Koknese hill fort[42]. Crossbow nuts were found during the excavations at Turaida Castle of the Bishop of Riga and Cēsis — Castle of the Order's Commander[43]. A fragment of a crossbow nut found during the archaeological excavations in Frombork (Frauenburg), the Teutonic Knights' Prussian territory, presently Poland, was dated at the late Medieval Period (1250 — the 15th century)[44]. A crossbow nut was found in the 15th century layer during the excavations at the Santok hill-fort (Santok, the Polish littoral, 15th century Brandenburg)[45]. In the 1980s, over 20 fragments of crossbow nuts dating from the 11th–15th centuries, found during the archaeological excavations in present-day Poland, were registered[46]. According to the data of more recent excavations, another crossbow nut is known from Wroclaw, Silesia[47].

In fractions of crossbow nuts, the metallic parts of the crossbow lock and trigger, the so-called levers, are often found. A trigger lever had a pivot hole, a short arm and a long arm. The short arm immobilized the crossbow nut by pressing the long arm against the stock; the short arm would move down loosening the nut. After the nut had turned around the axis of the thread, the string was released. Triggers were made of iron and in the written sources of the Order they were often referred to as *Bügel* (Fig. 4: C).

A crossbow nut with a fraction of the short arm of a trigger found at Vilnius Lower Castle is no exception either (Fig. 5: 3). This nut must have been lost during one of the Crusaders' assaults in

[39] *Ibidem*, p. 167, photo No 1.

[40] P. F. Lysenko, *Bereste...*, p. 283, figs. 194: 2, 3, 4.

[41] *Ibidem*, p. 283.

[42] *Latvijas PSR arheologija*, Rīga 1974. p. 215, fig. 131: 1.

[43] *Turaidas arheologiska ekspedicija 1976–1990*,[in] *LZA, Vēstures institūts*, 1990, fig. 6: 6; Z. Apala, *Cēsu arheologiskās ekspedicijas darbs*, [in:] *Zinātniskās atskaites sesijas materiāli par arheologu un etnografu 1990 un 1991 gada pētījumi rezultatem*, Rīga 1992, pp. 5–8. p. 7, fig. 1: 14.

[44] *Broń średniowieczna z ziem polskich* (*Medieval Weapons from Polish Lands*), Łódź, 1978, catalogue No. 161.

[45] A. Nadolski, *Studia nad uzbrojeniem polskim w X, XI i XII wieku* (*Studies in Polish Arms and Armour in the 10th, 11th and 12th Centuries*), Łódź 1954. p. 62.

[46] T. Wojciechowski, *Znaleziska fragmentów...*, pp. 483, 486, 487, fig. 1, 3, table No 1.

[47] C. Buśko, J. Piekalski, *Możliwości poznawcze archeologii w badaniach życia codziennego w średniowiecznym mieście na przykładzie parcel przy ul. Więziennej 10–11 we Wrocławiu* (*The Cognitive Possibilites of Archeology in the Investigation of Everyday Life. Plots Nos. 10–11 Więzienna Street in Wrocław*), „Archeologia Historica Polona", Vol. 7, Toruń 1998, pp. 11–32, 18, fig. 6: 4.

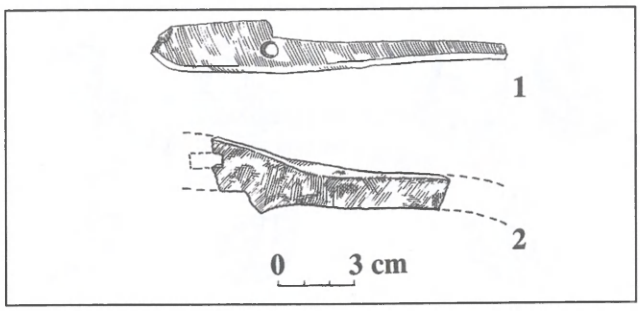

Fig. 6. Fragments of crossbow triggers, second half of the 14th — first half of the 15th century.

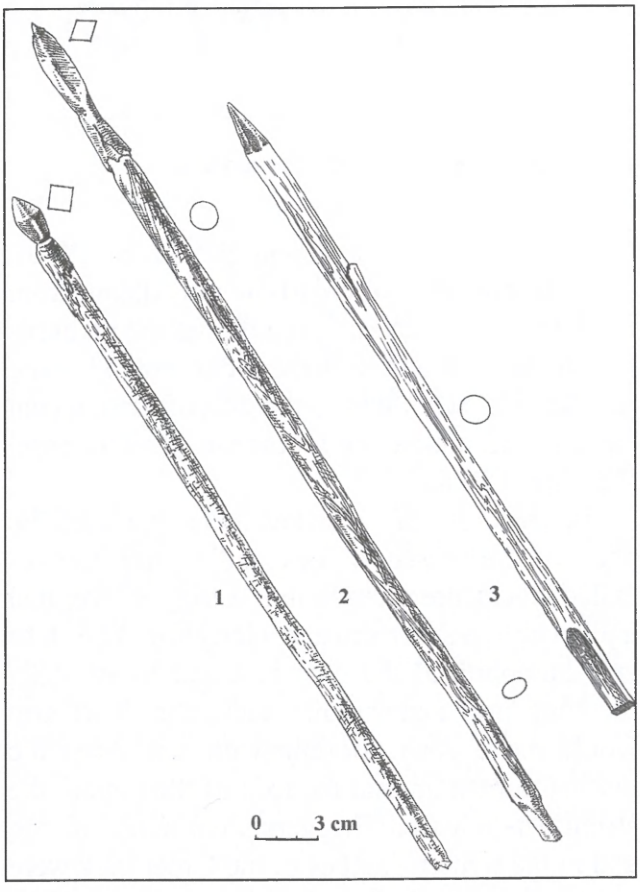

Fig. 7. Crossbow arrows, 4th quarter of the 14th — beginning of the 15th century.

the late 14th — early 15th century[48]. A fragment of the long arm of a trigger was found in the analogously dated layer (Fig. 6: 1)[49]. On the approaches to Vilnius Castle, another fragment of a nut with a fraction of the short arm, dated at the first half of the 15th century at the latest as well as a relatively large fragment of the long arm were discovered (Fig. 5: 9; Fig. 6: 2)[50].

In Belarus, during the excavations at Mstislav Castle, Mogilev district, in the 15th century layer, two triggers for levering the string were found[51]. In the 15th century, Mstislav continued to be one of the GDL's advanced posts in the east, and in 1390, the younger brother of Grand Duke Jogaila, Karigaila, Duke of Mstislav, sacrificed his life defending Vilnius Crooked Castle (*Curvum castrum)*[52].

During the excavations at the Bishop of Riga's Lielvārde Castle, a crossbow trigger was found[53]. During the archaeological works conducted at Plemięta Castle (*Castrum Clementis*), two triggers were unearthed[54]. One of them is 38 cm long. Plemięta Castle, Chełmno district, was destroyed by GDL troops in 1414. Both triggers from Plemięta are connected with the demolition of the Castle in the 15th century.

The earliest trigger, dated at the 13th century, coming from the territory of present-day Poland, was found during the excavations at the Lekarice Nowe mound, Radom województwo (province)[55]. Before the works at Plemięta, only one trigger, dated at circa 1380, had been found in Siedlatków[56]. Six triggers have been found in Poland so far[57].

During the excavations at Vilnius Lower Castle in 2003, a crossbow bolt shaft was found. Its chronology corresponds to the assaults on Vilnius Castle in the late 14th — early 15th century[58]. The shaft is 36 cm long and 10, 11 mm in diameter (Fig. 7: 3). The shaft is made of fir (*Abies*) wood.

[48] G. Striška, *Vilniaus žemutinės...*, list of finds No. 4874.

[49] E. Ožalas, *Vilniaus žemutinės...*, Vol. 1, p. 81, Vol. 2, pp. 162, 202, photo No. 299, fig. 133, Vol. 5, p. 102, No. 831.

[50] G. Rackevičius, *Arbaletas ir lankas...*, p. 32, fig. 6: 7.

[51] „Arkheologiya Belarusi", Vol. 4, Minsk 2001, pp. 281, 407, figs. 174: 8, 9.

[52] V. Marburgietis, *Naujoji Prūsijos...*, pp. 199, 368.

[53] A. Zariņa, *Izrakumi Lielvārdē 1976 gadā*, [in:] *ZASMipar arheologu un etnogrąfu 1976 gada pētījumi rezultatem*, Riga 1977, pp. 76–80, 78, fig. 17: 20.

[54] A. Kola, G. Wilke, *Militaria z grodziska w Plemiętach. Broń strzelca*, [in:] *Plemięta. Średniowieczny gródek w ziemi Chełmińskiej* (*Military Accessories from the Stronghold in Plemięta. The Missile Weapons*), Warszawa–Poznań–Toruń 1985, pp. 107–128, 114–116, figs. 13: 1, 2.

[55] A. Nowakowski, *Uzbrojenie średniowieczne w Polsce (na tle środkowoeuropejskim)* (*Medieval Arms and Armour in Poland (Against a Background of Central Europe*), Toruń 1991, p. 78.

[56] A. Kola, G. Wilke, *Militaria z grodziska ...*, p. 116; A. Nadolski, M. Lewandowski, *Broń strzelcza...*, p. 149, 503, fig. 28.

[57] T. Wojciechowski, *Znaleziska fragmentów...*, p. 488, fig. 4.

[58] E. Ožalas, *Vilniaus žemutinės...*, Vol. 1, p. 80, Vol. 2, p. 170, photo No. 338, Vol. 4, p. 268, No. 122.

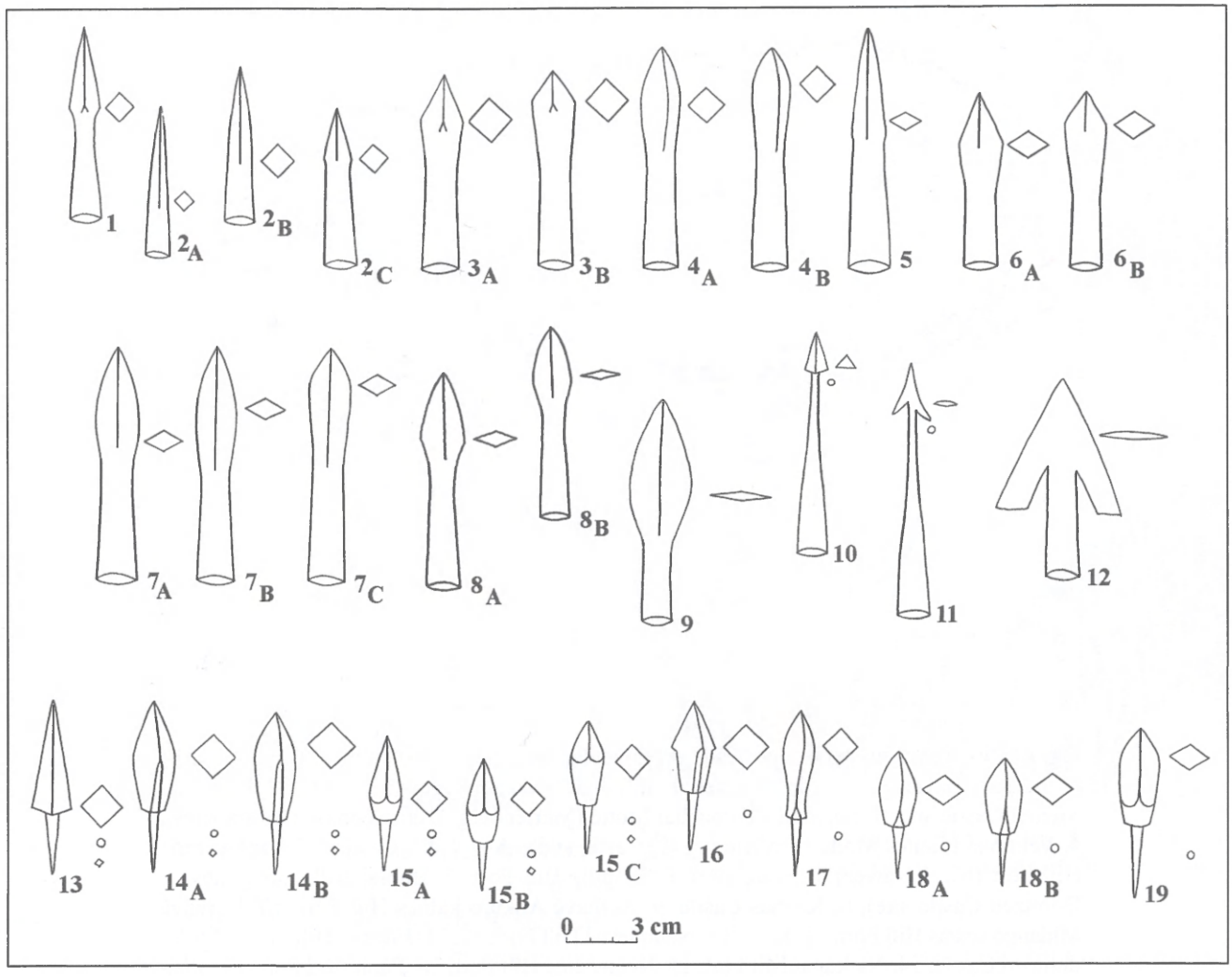

Fig. 8. Types of crossbow arrowheads in the present-day of Lithuania, beginning of the 13th – first half of the 16th century.

Although the shaft was pointed to fix a socketed arrowhead, there are no signs of an arrowhead on it. Presumably, the shaft was made to attach an unfinished or faulty bolt (the shaft is cracked and it remains unclear when the crack appeared).

It is known that the full length of the bolt a fragment of which was found at Vilnius Lower Castle and the length of a bolt found on the approaches to Trakai Castle were 53 cm and 48 cm respectively[59]. These bolts were lost in the second half of the 14th — early 15th century and hence can be related to the attacks on Vilnius and Naujieji Trakai mentioned in written sources (Fig. 7: 1, 2).

The chronologically most recent find is the discovery of several hundreds bolts, bolt heads, shafts, featherings and unfinished shafts (rejections) as well as fragments of these at St Peter's Tower of Legnica Castle. The bolts were hidden in the Tower's wall in 1416–1618[60]. These traces of bolt production, dating from the 15th century, were found during the conservation works carried out at the castle[61]. The average length of the bolts from Legnica is 33 cm and the full length, together with the head, was 37 cm[62]. The 16th century cross-bow bolts from the Province of Dalarna (Dalekarlien) in Central Sweden range from 34 to 38 cm in length[63]. The length of still

[59] G. Rackevičius, *Arbaleto strėlės (Vilniaus bei Trakų strėlių palyginamoji analizė)*, "Lietuvos archeologija", Vol. 18, Vilnius 1999. pp. 165–173, 166, 168, 170, 172, fig. 1; G. Rackevičius, *Arbaletas ir lankas...*, p. 45, fig. 15.

[60] *Broń średniowieczna...*, catalogue No. 165.

[61] A. Nadolski, M. Lewandowski, *Broń strzelcza...*, p. 509, fig. 49.

[62] M. Lewandowski, *L'atelier du fléchier, dans la tour de pierre au château de Legnica* "Fasciculi Archaeologiae Historicae". Fasc I, Wrocław–Warszawa–Kraków–Łódź, 1986, pp. 49–53, 49, 52, fig. 4.

[63] S. Ekdahl, *Die Bewaffnung der swedischen Bauern im Mittelalter*,"Fasciculi Archaeologiae Historicae", Fasc. XI, Łódź 1998. pp. 17–38, 31.

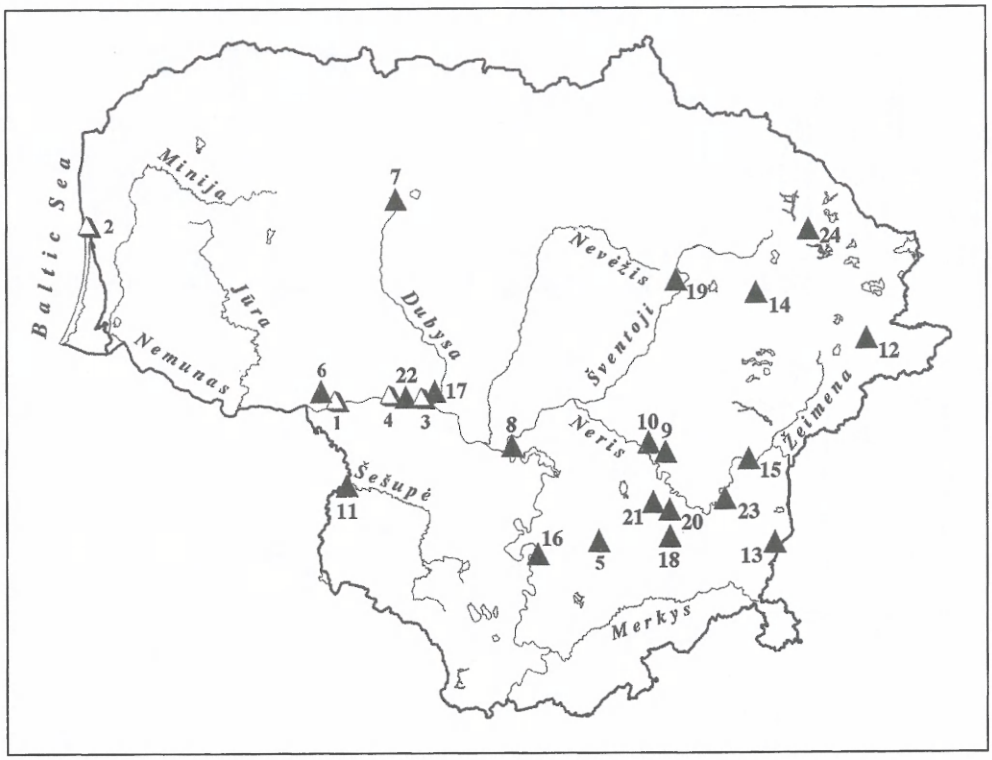

Fig. 9. Sites where crossbow arrowheads were found in present-day, beginning of 13th — first half of the 16th century. Δ — Orders Castles: 1. Bišpiliukai Motte (Jurgen Castle site), 2. Klaipėda-Memel Castle site, 3. Seredžius Palocėliai Motte (Marienburg, Dubissenburg Castles sites), 4. Veliuona Pilaitės Motte (Nayernburg (?) Castle site); ▲— Gdl's Castles: 5.Aukštadvaris Hill Fort (Navė-Nawenpil Castle site), 6. Bišpilis Hill Fort, 7. Bubiai Hill Fort (Dubysa-Dobitzen Castle site), 8. Kaunas Castle, 9. Kernavė Ankuro kalnas Hill Fort, 10. Kernavė Midaugo sostas Hill Fort, 11. Kudirkos Naumiestis Hill Fort, 12. Mažulonys Hill Fort, 13. Medininkai Castle, 14. Narkūnai Hill Fort, 15. Nemenčinė Hill Fort, 16. Punia Hill Fort, 17. Seredžius Hill Fort (Pieštvė-Pisten Castle site), 18. Senieji Trakai Castle site, 19. Šeimyniškėliai Hill Fort, 20. Trakai Peninsular Castle, 21. Trakai Insular Castle, 22. Veliuona Hill Fort (Veliuona-Welun Castle site), 23. Vilnius Castles, 24. Vosgėliai Hill Fort.

later, 16th–17th century, bolts ranged from 30 to 40 cm[64].

There are about 450 hill forts dating from the beginning of the second millennium AD in the territory of Lithuania[65]. Not all of them can be defined as wooden castle sites[66]. According to written sources, there are more than 70 hill forts, stone and wooden castle sites and stone castles dating back to the 13th — the early 15th centuries[67]. Of course, there are problems with the localization of some of them. Crossbow arrow heads have been found at over 20 of these castles and castle sites (Fig. 9).

According to the data from the Order's documents in 1404 in Prussia, there were at least a million ammunition arrows[68]. Undoubtedly, a large number of arrows were used at war time. Both sides of a conflict used to pick up arrows after the battle. They also used to buy part of them and produce the rest. Over 2000 remains of crossbow arrows, mainly arrowheads, have been found during archaeological excavations in present-day

[64] A. F. Medvedev, *Ruchnoye metatelnoye oruzhe (lyk i strely, samostrel) VIII–XIV gg.*, [in:] „Arkheologiya SSR, svod arkheologiheskihk isstochnikov" *E1–36*, Moskva 1966, p. 93.

[65] G. Zabiela, *Lietuvos medinės pilys,* Vilnius 1995, p. 74; G. Zabiela, *Castle Warfare between Lithuania and the Order in Lower Panemunė in the Late Middle Ages*, "Castella Maris Baltici", 6, Vilnius 2004, pp. 211–218, 212.

[66] G. Zabiela, *Pilys rytų Lietuvoje valstybės kūrimosi metu*, „Lietuvos valstybė XII–XVIII a", Vilnius 1997, pp. 459–474, 460.

[67] T. Baranauskas, *Lietuvos medinės pilys rašytinių šaltinių duomenimis*, „Lietuvos archeologija", Vol. 24, Vilnius 2003, pp. 56–106, 77.

[68] S. Ekdahl, *Die Armbrust im Deutschordensland...*, pp. 29, 30.

Lithuanian territory[69]. On the basis of their shape they fall into 19 types (Fig. 8). Almost all of them were used during sieges of Vilnius castles (types No 1, 5, 9, 12, 17, 19 are the only exceptions here). The shape of the majority of arrowheads used by both belligerents was the same. In my opinion, the arrowheads of type No 8 deserve special attention (Fig. 8: 8). A number of identically shaped arrowheads come from the 1419 fire layer at Vilnius Castle. They belong to a group of over 450 arrowheads found within the defensive walls. Therefore, we can be sure that at the moment of firing they belonged to the defenders of the castle[70]. Identically shaped arrowheads are known from the hill fort called Lokstene, the *Locksteen* Castle site, in present-day Latvia[71]. These arrowheads were found in the layer dated at the end of the 14th — the early 15th century. According to the Order's chronicles, *Locksteen* Castle, belonging to a vassal of the Bishop of Riga, was demolished by Kęstutis' troops in 1375[72]. It is possible that Lithuanian crossbowmen lost some arrows during the siege of 1375.

I would like to draw attention to the archaeological material well known in neighbouring countries, namely parts of the crossbow such as stirrups. I failed to find them in Lithuanian museums. Only one well known iconographical source from the former Order's territory can be quoted here. It is the Resurrection, part of the famous polytypic from Grudziądz (*Graudenz*) Castle (Fig. 10). The painting from the chapel altar of Grudziądz Castle was created at the end of 14th century[73]. In the painting, one of the sleeping Roman guards is armed with a crossbow, which was typical of a crusader's shooter at the end of the 14th century. In the Order's written sources, there are some names of crossbows and their definitions. In former historiography, the construction of the crossbow in the Grudziądz polytypic is interpreted as *Stegereiffarmbrost*[74]. Originally, crossbows of such construction were bent by hand, and by the end of 14th century, most of them had hooks: a belt and claw — (the *Spannhaken*), or its modification: a cord and pulley (the *Seilrollenspanner*)[75]. I would like to invite my colleagues to discuss the following question: Is the stirrup of the crossbow represented in the painting wide enough? Unmistakably, the feet of the Roman (German) shooter are too wide to be set in the crossbow's stirrup (Fig. 10). Most probably the crossbowman is armed with a crossbow with a narrow stirrup. Such stirrups were very often used in crossbows bent with a wooden lever — the *Wippe*. In written sources, crossbows of this type are referred to as *Wipparmbrust*[76]. Of course the interpretation of the construction of crossbows is rather complicated and many crucial questions remain unanswered[77].

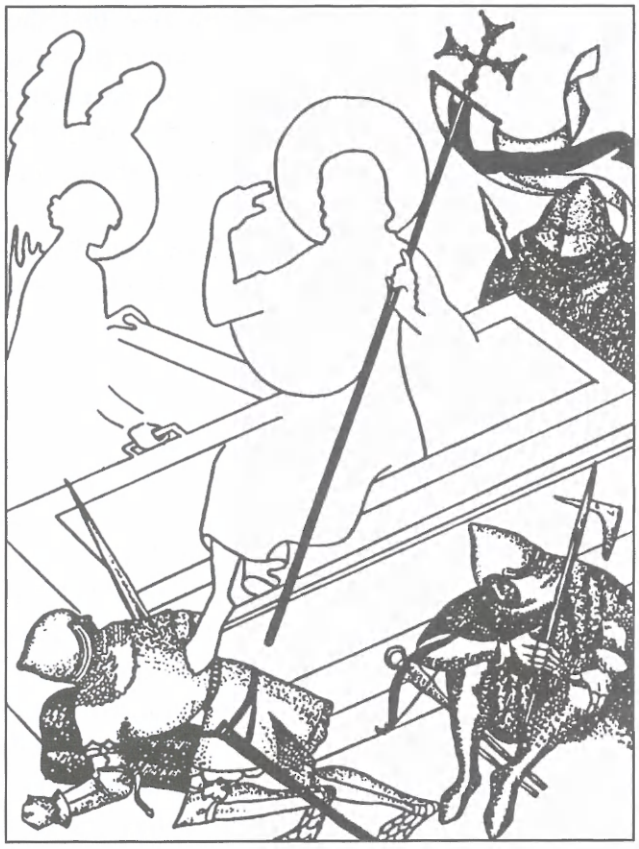

Fig. 10. Scene of resurrection from the altar painting at Grudziądz (Graudenz) Castle, 4th quarte of the 14th century.

[69] G. Rackevičius, *Arbaletas ir lankas...*, p. 61, fig. 27.

[70] G. Rackevičius, *XV a. pr. strėlių antgaliai Vilniaus žemutinėje pilyje, Vilniaus žemutinės pilies rūmai,* Vilnius 1999, pp. 270–279, 319, 357, 271.

[71] Ē. Mugurevičs, *Oliňkalna un Lokstenes pilsnovadi*, Rīga 1977, table XXXI, Nos. 1, 2.

[72] Hermanas iš Vartbergės, *Livonijos kronika...*, p. 202.

[73] A. Kola, G. Wilke, *Militaria grodziska...*, p. 116.

[74] *Ibidem*, p. 116; A. Nowakowski, Uzbrojenie wojsk krzyżackich w Prusach w XIV w. i na początku XV w. (Arms and Armour of Teutonic Forces in Prussia in the 14th and at the Beginning of the 15th Centuries), Łódź 1980, p.60, fig. 24.

[75] S. Ekdahl, *Die Armbrust im Deutschordensland...*, pp. 34, 35, figs. 7, 10, 11.

[76] *Ibidem*, pp. 26, 35, fig. 9.

[77] *Ibidem*, p. 26.

Finally, I would like to emphasize that the crossbow was a weapon widely used by both sides in warfare. It played a major role in attacks on and defence of castles. The attacks on Vilnius Castle and its defence in the late 14th — early 15th centuries were no exception.

Translated by Dalia Šatienė

List of abbreviations

ALH — Archive of Lithuanian Institute of History.

AVC — Archive of Vilnius County.

CRC — Castle Research Centre: "Lithuanian Castles".