



ВОЕННАЯ ИСТОРИЯ Речи Посполитой

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## VOLLEY FIRE IN EUROPE IN THE MID-16<sup>TH</sup> CENTURY\*

The genesis of implementing volley fire, or firing in subsequent salvos at short intervals is a debatable subject. Geoffrey Parker proposed the thesis of a parallel occurrence of this concept in Europe (the Battle of Newport, 1600) and Japan (Nagashino, 1575). He also suggested that archival findings could prove the thesis of the Japanese art affecting that European<sup>1</sup>.

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<sup>1</sup> *Parker G.* From the House of Orange to the House of Bush: 400 years of military revolutions, or how to prepare for the next Gulf War // *Military Spectator*. 2003. Vol. 172. No. 4. P. 177–193;

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The theses were extremely inspiring and triggered a vivid discussion, since they introduced a new essential component into the theory of military revolution. Namely, the efficient use of military technology depended on theoretical tactical solutions that maximized the effectiveness of the weapons used. Thus, it is important to study not only technological solutions and their flow, but what is equally important, practical ideas and concepts. However, it turns out that the reality involved in relation Parker's thesis is more complex. First, the use of volley fire in 1575 in Japan seems controversial and is now thought to have emerged in the 1590s<sup>2</sup>. Second, analogous solutions had been known earlier in Europe. It is widely known that the Dutch practiced a countermarch in six ranks under the command of William Louis, count of Nassau, since at last 1594<sup>3</sup>. It turns out, however, that the Spanish had known the countermarch in three ranks even earlier, at least in 1592, when it was described by Martin de Eguiluz in his military treatise<sup>4</sup>. Also in the 1590s, the Ottoman troops applied volley fire by arranging janissaries in three ranks, who after shooting squatted (knelt) and reloaded their guns. It is probable that the janissary units used the technique much earlier<sup>5</sup>. Third, there is a possible Far Eastern thread to this story. The genesis of volley fire is perceived in Chinese military transformations of the mid-16<sup>th</sup> century. It was undeniably described by General Qi Jiguang (1528–1588) in his military treatise «*Ji xiao xin shu*». He proposed creating separate 12-person squads of 10 shooters, a commander, and one person to deal with supplies. These arquebusiers were divided into five ranks and could shoot in salvos<sup>6</sup>. It is important to add that

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extended version see: *Parker G. Od domu orańskiego do domu Bushów: czterysta lat «rewolucji militarnej»* / Transl. M. Kopczyński // *Przegląd Historyczny*. 2005. Vol. 96. No. 2. P. 217–243. Cf.: *Parker G. The Limits to Revolutions in Military Affairs: Maurice of Nassau, the Battle of Nieuwpoort (1600), and the Legacy* // *Journal of Military History*. 2007. Vol. 71. No. 2. P. 331–372.

<sup>2</sup> This method of combat was used in the 1590s during the invasion on Korea, and also on the territory of Japan from 1615 onwards: *Lidin O. G. Tanegashima: The Arrival of Europe in Japan*. Copenhagen, 2002; *Varley P. Oda Nobunaga, Guns, and Early Modern Warfare in Japan* // *Writing histories in Japan: texts and their transformations from ancient times through the Meiji Era* / Ed. By J. C. Baxter, J. A. Fogel, 2007. P. 105–125; *Andrade T., Kang H. H., Cooper K. A Korean Military Revolution?: Parallel Military Innovations in East Asia and Europe* // *Journal of World History*. 2014. Vol. 25. No. 1. P. 51–84.

<sup>3</sup> W. L. Nassau to M. van Nassau, Groning 8 XII 1594, Koninklijke Huisarchief (Haga), MS. A22 [Willem Lodewijk, graaf van Nassau Dillenburg (1560–1620)], IB2a-19-79; *Parker G. Od domu...* P. 221.

<sup>4</sup> *Eguiluz M. de Milicia, discurso y regla militar*. Madrid, 1592. P. 69; *Hernández A. J. R. Breve historia de los Tercios de Flandes*. Madrid, 2015; *Andrade T. 1) The Gunpowder Age: China, Military Innovation, and the Rise of the West in World History*. Princeton, 2016. P. 147–148; 2) *The Arquebus Volley Technique in China, c. 1560: Evidence from the Writings of Qi Jiguang* // *Journal of Chinese Military History*. 2015. Vol. 4. P. 119.

<sup>5</sup> *Börekeçi G. A Contribution to the Military Revolution Debate. The Janissaries use of Volley Fire during the Long Ottoman-Habsburg War of 1593–1606 and the Problem of Origins* // *Acta Orientalia Academiae Scientiarum Hungaricae*. 2006. Vol. 59. No. 4. P. 407–438.

<sup>6</sup> We know two different editions of the work. One was published in 1560–1561, and the other in 1584. The former contains 18 chapters and the Introduction, the latter 14 chapters. The first edition is available in electronic form: URL: <http://www.cos.url.tw/book/6/O-1-057.htm>. We use the five-volume edition (the first volume includes books 1–6, the second 7–10, the third 11–14, the fourth 15–17 and the fifth 18) from the platform: URL: <https://archive.org/details/06049821.cn/page/n114/mode/2up>; *Andrade T. The Arquebus...* P. 115–141.

there are hypotheses of an even earlier use of «volley technique / volley firing» by Emperor Babur of the Mogul dynasty as early as 1528<sup>7</sup>. Researchers of Ottoman military assert that volley fire was used in the battle of Mohács (1526)<sup>8</sup>. The oldest single example of the volley technique took place in 1388, when shooters formed in three groups were expected to stop over 100 war elephants in the combat against the state Mong Mao<sup>9</sup>. The last of the establishments mentioned, however, seem to be devoid of unequivocal source evidence and is largely based on the interpretation of single sources<sup>10</sup>.

This brief overview shows that previous findings are divergent and often mutually contradictory. The authors of this article aim to set existent knowledge in order, including the Euro-Asian context of the transformations connected with the military revolution and volley fire<sup>11</sup>. The source base is made up of historical sources of Polish provenance from the mid-16<sup>th</sup> century. Primarily we draw on the information on the application of volley fire in the military treatise titled «Consillium rationis bellicae» by Jan Tarnowski<sup>12</sup>. The material in this article has been missed by Polish researchers and has not been the subject of its own study or exiguous research.

Turning to an analysis of Tarnowski's (1488–1562) treatise, it is important to remember that he was a practitioner and not a military theoretician. He fulfilled the function of commander-in-chief of the Polish troops in the years 1527–1559 (Grand Crown Hetman). In that period he participated in the wars against the Grand Duchy of Muscovy, Moldavia, and the Tatars. He also dealt with the Ottoman military, going to rescue Belgrad sieged by the Ottomans (1521), and a little later operating against their invasion of Red Ruthenia (1524)<sup>13</sup>. Moreover, in his early life (1518–1520) he made a trip through Venice, Rome, the Holy Land, Greece, Spain,

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<sup>7</sup> Khan I. A. The Nature of Handguns in Mughal India: 16<sup>th</sup> cfc 17<sup>th</sup> Centuries // Proceedings of the Indian History Congress. 1991. Vol. 52. P. 382.

<sup>8</sup> Ágoston G. Firearms and Military Adaptation: The Ottomans and the European Military Revolution, 1450–1800 // Journal of World History. 2014. Vol. 25. No. 1. P. 96–98; Börekçi G. A Contribution... P. 430–433.

<sup>9</sup> Kaushik R. Military Transition in Early Modern Asia, 1400–1750. London; New York, 2014. P. 21; Laichen S. Military technology transfers from Ming China and the emergence of northern mainland Southeast Asia (c. 1390–1527) // Journal of Southeast Asian Studies. 2003. Vol. 34. No. 3. P. 500.

<sup>10</sup> A key problem of volley fire is the question if, after the salvos of all ranks, it was possible to repeat the whole maneuver in equal temporal intervals. In the example of 1388, exactly three salvos were provided for against elephants, so it is difficult to consider this solution as volley fire, although we are dealing with an intermediate phenomenon. A similar interpretative difficulty emerges frequently because of the ambiguity of historical sources.

<sup>11</sup> Recently, certain scholars emphasize that the military revolution began on the territory of China c. 1368, when Zhu Yuanzhang included shooters with firearms into his troops, which enabled him to start the new Ming dynasty. Then, he moved his army towards neighboring countries, which encountered the new type of troops and learned the solutions. Thus, the transformations finally reached Europe, where firearms and artillery were adapted in the development of military and the organization of state structures (Andrade T., Kang H. H., Cooper K. A Korean... P. 52–60).

<sup>12</sup> Tarnowski J. Consillium rationis bellicae. Kraków, 1558 (modern edition: Warszawa, 1987 / Ed. by J. Sikorski, T. M. Nowak).

<sup>13</sup> Dworzarzek W. Hetman Jan Tarnowski. Z dziejów możnowładztwa małopolskiego. Warszawa, 1985. P. 22–23.

Portugal, and then England, France, Germany, and Bohemia. He gained military experience with King Manuel I of Portugal (1495–1521), fighting, for example, against Berbers in today's Morocco (Asilah)<sup>14</sup>. In 1542 he left Poland again to head for Italy. Thus, we can assume that he was a soldier rich in experience gained not only in Central Europe; he perceived the context of military transformation in all of Europe. Moreover, he used his practical experience gained in Africa constructing border defenses against the Tatars<sup>15</sup>.

Consequently, «Consilium rationisbellicae» is a recapitulation of many years of personal experience. The book was printed in 1558. Interestingly, in its fundamental part it was prepared in Polish, which affected its local reception, confined only to the Kingdom of Poland and the Grand Duchy of Lithuania<sup>16</sup>. This action, however, was deliberate, since the work was addressed to Polish commanders and soldiers, who did not necessarily have a classical education<sup>17</sup>. Tarnowski knew Latin perfectly; he wrote letters in this language and used it for the diary of his journey to the Holy Land (1518)<sup>18</sup>; and he wrote the preface to «Consilium» in Latin.

In our considerations a fragment addressed to infantry commanders (rotmistrzes or captains) is of key importance. Due to its essence, we provide a longer quotation translated into English, as well as a fragment of a page from the first edition of the book (Fig. 1).

The description shows three main facts. First, the hetman obliged infantry commanders to teach their soldiers to shoot and fire in battle. Second, more importantly, the volley fire was not Tarnowski's invention. On the contrary, this part demonstrates that it was knowledge

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<sup>14</sup> *Spieralski Z.* Jan Tarnowski 1488–1561. Warszawa, 1977. P. 80–83; *Dworzarzek W.* Hetman... P. 19–21; *Winczura Ł.* Hetman hetmanów Jan Amor Tarnowski (1488–1561). Kraków, 2005. P. 29–41, 144–262.

<sup>15</sup> *Dziubiński A.* Polsko-litewskie napady na tureckie pogranicze czarnomorskie w epoce dwu ostatnich Jagiellonów // *Kwartalnik Historyczny.* 1996. Vol. 103. No. 3. P. 56–57.

<sup>16</sup> Certainly, Tarnowski's work written in Latin or in German would have been widely read in Europe. He was well known across the continent, and the evidence of his importance is the fact that Friedrich I Habsburg offered him a part in his anti-Ottoman expedition in 1542 (probably in the military staff, since it was Joachim Hector, the elector of Brandenburg who was to become a commander-in-chief, which was confirmed by the Diet of Speyer). Jan Tarnowski suggested for the commander of the expedition Albert Hochozollern, the Duke of Prussia and his friend. In effect, as early as the same year, Johannes Strazius arrived in Cracow, who prepared a memorial on the war against the Ottomans on the basis of his conversation with Tarnowski: *Spieralski Z.* Jana Tarnowskiego rozmowa o prowadzeniu wojny z Turkami (1542) // *Studia i Materiały do Historii Wojskowości.* 1986. Vol. 29. P. 287–312. It was published years later: Ioannis Comitiss Tarnovii [...] De Bello Cum juratissimis Christianae Fidei hostibus Turcis gerendo Disputatio Sapientissima [...] / Ed. by Johannes Strazius, Herbipoli [Würzburg], 1595. Cf.: *Spieralski J.* Jan Tarnowski... P. 310–314; *Winczura Ł.* Hetman hetmanów... P. 216–228.

<sup>17</sup> The evidence of this is the fact that military laws addressed to soldiers were prepared in their mother tongue. In the Kingdom of Poland they were almost always written in Polish (except when they concerned mercenaries recruited abroad). The oldest known military regulatory act «Mandat (...) ku popisowi wszystkich służebnych, jezdnych i pieszych» of 1525, written in Polish is simultaneously the oldest legal document, the authentic ediction of which was prepared not in Latin but in Polish. See: *Lopatecki K.* «Disciplina militaris» w wojskach Rzeczypospolitej do połowy XVII wieku. Białystok, 2012. P. 52–54, 75, 458, 692–693.

<sup>18</sup> *Dziennik podróży Jana Tarnowskiego do Ziemi Świętej z 1518 roku / Transl. R. Sawa; ed. by D. Chemperk // Odrodzenie i Reformacja w Polsce.* 2005. Vol. 49. P. 187–194.

with which Christian military veterans were familiar. Third, reloading the guns should be done in a Turkish way, where the ranks having fired a salvo should kneel. Unfortunately, it was not specified in how many ranks the infantry was arranged. Research shows, however,

**G** Pieszy Komistrze doświadczać w strzelaniu maia swych towarzyszow / A vzyć ie iako w birwie strzelby vzyć maia/ponieważ tego potrzeba/gdyż tu v nas w Polsce maia veteranos milites/a skoro każda wyprawa/wiele ludzi nowych/ a mienniejszych : A rąf aby ie dobze strzelac vzyli. A gdyby ku birwie przyszlo/ gdy pierwszy rząd wystrzeli/ aby przykneleli/ a zasye nabijali. A drugi rząd za nimi aby strzelali/ tymże obycaiem porym też przykneleli: Aby rąf we wszystkich rzędzech, pozatiem czynili/ a rym pozadnem strzelali / y wystrzelawszy aby nabiziali/ rąf iako sye tu napisalo.

Infantry captains are expected to train soldiers in shooting and to teach them how to use guns during a battle, because it is very necessary, since we in Poland have few veterans, and every unit has many inexperienced novices; therefore they should be taught to shoot. If it comes to a battle, when the first rank have shot, they are to kneel and begin to load the guns. The second rank should shoot after them, and then also kneel. They should do the same in all ranks and they should shoot in this way, after shooting load, as written above. (Tarnowski J. Consillium... P. 19v.)

Figure 1. Tarnowski, Jan. Consillium rationis bellicae. Kraków: Andrysowic Łazarz, 1558. k. 19v. We use the copy residing in: Biblioteka Książąt Czartoryskich – National Museum in Kraków, sign. 185 II Cim (public domain: <https://polona.pl/item/consilivm-rationis-bellicae,NDQ2NTA5NjM/18/#info:metadata>)

that nearly always Polish troops were arranged in eight ranks, out of which usually six were equipped in firearms<sup>19</sup>.

The specificity of the Polish army was considerably different from that of European custom. The core of the troops was cavalry, whereas infantry was not numerous. In contrast to other countries, however, the latter was predominantly focused on shooting, and already in the first half of the 16<sup>th</sup> century around 75 % of soldiers were shooters<sup>20</sup>. There was no need to hire numerous pikemen, since the cavalry provided protection for the troops. The conclusion of the necessity of organizing effective fire of infantry troops armed in this way is obvious. The deficit of experienced soldiers emphasized by Tarnowski is close to mass statistics. Around 60 % were recruited from burghers, who spent in the army merely three to twelve months<sup>21</sup>. The training must have been intense and systemically organized, for it was not possible to acquire competences from older comrades during the long service<sup>22</sup>.

<sup>19</sup> Boldyrew A. Piechota zaciężna w Polsce w pierwszej połowie XVI wieku. Warszawa, 2011. P. 336–341.

<sup>20</sup> Tactical units: escuadron (batallions), created from Spanish tercios at the beginning of the 80years' war, by rule should consist in 1/3 of arquebusiers and in 2/3 of pikemen, see *Londoño S. de Discurso sobre la forma de reducir la disciplina a mejor y antiguo estado*. Brussels, 1589.

<sup>21</sup> Boldyrew A. Piechota... P. 143–150, 152. — For example, in 1497 two men were recruited to infantry, who even had a rusznica. They both, was was emphasized, could not even load it. *Archiwum Główne Akt Dawnych w Warszawie: Archiwum Skarbu Koronnego. Oddział 85 (Central Archive for Historical Records in Warsaw, Division 85)*. Sign. 3. K. 109v, 111; *Grabarczyk T. Piechota zaciężna Królestwa Polskiego w XV wieku*. Łódź, 2000. P. 155.

<sup>22</sup> It was different in the Spanish army, of key importance were relations connecting soldiers in the framework of the so-called «camardas» (informal groups of c. 4–6 soldiers), who practiced drill and combat together. Within those groups occurred exchange of experience between the veterans (soldados viejos) and «novices» (bisoños): *González de León F. The Road to Rocroi Class, Culture and Command in the Spanish Army of Flanders, 1567–1659*. Leiden; Boston, 2009. P. 53–57,

The initiative included in the treatise was not so much about introducing but rather maintaining the practice of infantry soldiers' training applied by Tarnowski. Another military commander, Florian Zebrzydowski, informs about the existence of this rule. In 1559, he addressed a letter to the commander-in-chief of the Lithuanian army, Mikołaj Radziwiłł «Rudy» (the Red), where he gave him certain military instructions. He ordered infantry commanders to provide training for their subordinates. This was an attempt at transferring the practice introduced in the Polish Crown by Jan Tarnowski into the territory of the Grand Duchy of Lithuania. Simultaneously, it was specified that the exercises in loading the guns and applying volley fire were to be practiced every two to three days. The author also underscored an obvious fact: «there's little use of him having a *rusznica*, if he can't shoot with it»<sup>23</sup>.

Thus, we perceive an obvious attempt at transferring solutions known in Western and Southern Europe to Poland and then Lithuania. It is important to assume, then, that the so-called volley fire must have been widely known among European commanders (not only Ottoman ones) in the mid-16<sup>th</sup> century.

The evidence complementing the argument of spreading this method of fire combat in Polish troops and, more broadly, European, is a painting representing the Battle of Orsha (1514) at the National Museum in Warsaw<sup>24</sup>. A great number of papers have been written analyzing this unique work and its genesis, often mutually contradictory. Not entering the polemic so far, there is no doubt that the picture was painted far later than the represented battle, most likely at the turn of the 1540s<sup>25</sup>. A person from a circle connected with the workshop of Lucas Cranach the Elder (1472–1553) or Hans Krell (1490–1565)<sup>26</sup>. The author of the painting did not prepare a reconstruction of the clash but he presented a widely understood image of Polish (and, more broadly, European) military at the end of the first half of the 16<sup>th</sup> century.

A detailed analysis of particular battle scenes shows an extraordinary theatre. In the central part of the painting, we can see a Polish infantry unit (*rota*) fighting the troops of the Grand Duchy of Muscovy (Fig. 2). The infantrymen are set in five ranks. The first is made up by pikemen in plate armours, the second consists of soldiers with pavises (big infantry shields, used in Central Europe at least from the days of the Hussite revolution), who also flank the side of the unit. Ranks 3–5 are made up by shooters with long handguns firing salvos at the enemy.

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112–115; Parker G. *The Army of Flanders and the Spanish Road 1567–1659. The Logistics of Spanish Victory and Defeat in the Low Countries' Wars*. Cambridge, 1972. P. 177–178.

<sup>23</sup> Hetman Florjan Zebrzydowski o porządku żołnierskim / Ed. by S. Bodniak // *Przegląd Historyczno-Wojskowy*. 1931. Vol. 3. No. 2. P. 303.

<sup>24</sup> Muzeum Narodowe w Warszawie, inventory number MP 2475.

<sup>25</sup> The evidence of this is, for example, dendrochronological examination of the wood used to paint the picture. The earliest possible year of creating the painting is 1525, and the earliest probable year of creating it is 1531, then 1539 and possibly 1545.

<sup>26</sup> *Żygulski Z. jun.* *The Battle of Orsha. An explication of the arms, armour, costumes, accoutrements and other matters for consideration portrayed in the approximately contemporary painting of a battle fought in Byelorussia in 1514* // *Art, Arms and Armour: an International Anthology*. Vol. 1 / Ed. by R. Held. Chiasso, 1979. P. 138; *Janicki M. A.* *Obraz «Bitwa pod Orszą» — geneza, datowanie, wzory graficzne a obraz bitwy «na Kropiwej» i inne przedstawienia batalijczne w wileńskim pałacu Radziwiłłów* // *Biblioteka Epoki Nowożytnej*. 2015. Vol. 3. P. 176–177, 221; cf.: *Kopplin D.* *Neue Werke von Lukas Cranach: und ein altes Bild einer polnischen Schlacht — von Hans Krell?* Basel, 2005. P. 71–105.

Obviously, it was not a 38-man unit that took part in the Battle of Orsha (the units contained several hundreds of soldiers in those days)<sup>27</sup>. The author, however, did not try to reconstruct the number of the army in his painting, but presented the types of soldiers' armaments and outfits, as well as patterns of tactical units' actions<sup>28</sup>.

We posit the thesis that the author of the work depicted the already common in European phenomenon of volley fire. To prove this idea, first we should verify the hypothesis proposed in 1979 by Zdzisław Żygulski Jr. He claimed that the infantry from the last rank was shooting simultaneously with the third rank, raising their guns high in order to direct the trajectory of the bullet along the parabola. This is obviously an erroneous hypothesis, the evidence of which is the fact that the fifth rank hold the guns in their left hands (not right), and the right

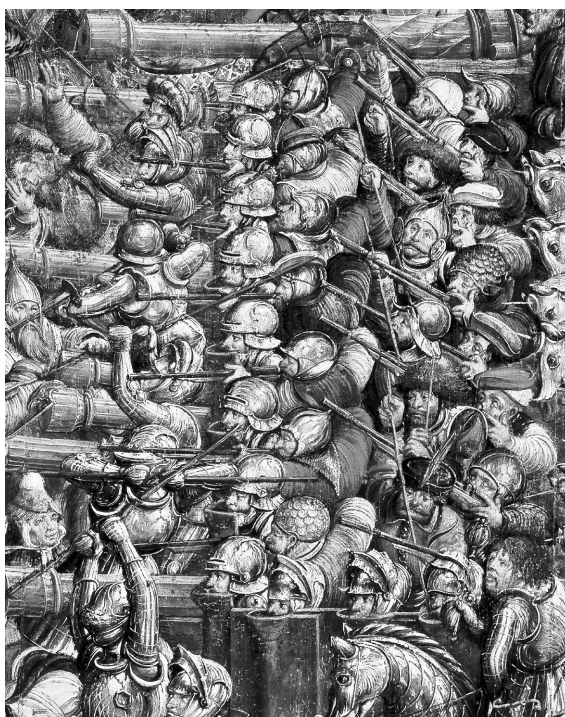
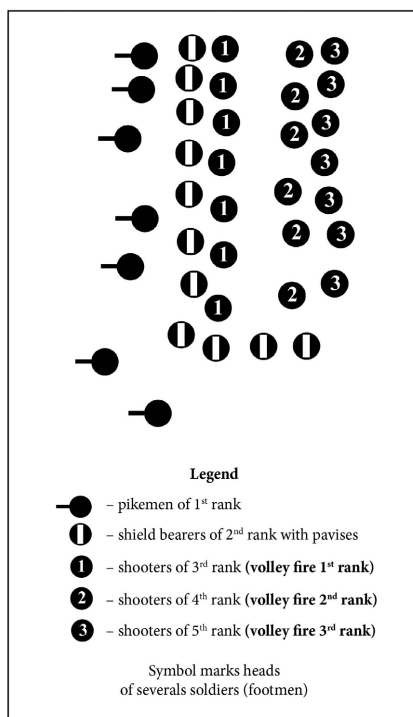


Figure 2. A unit of Polish infantry represented in the painting *The Battle of Orsha* with the interpretation of the unit's arrangement in five ranks (prepared by the authors). The National Museum in Warsaw, inventory number MP 2475, published with kind permission from the museum

<sup>27</sup> *Lesmaitis G.* LDK samdomoju kariuomenė XV a. pabaigoje – XVI a. antrojoje pusėje. Vilnius, 2010. P. 77–79.

<sup>28</sup> This representation could be also interpreter literally, because in the Polish Kingdom often occurred such tiny units. For example, in the years 1531–1547 (or in the period when the painting was most probably created), there appeared as many as 25 rotas of 31–41 men each: *Archiwum Skarbu Koronnego. Oddział 85. Sygn. 19. K. 214v–215v; Sygn. 22. K. 157v–159v, 171–171v; Sygn. 27. K. 89–90, 91–92, 93–94; Sygn. 32. K. 7–8v, 22–23, 30v–31, 35–36, 41v–42, 56v–58, 60v–61v, 162–162v; Sygn. 36. K. 88–89v; Sygn. 39. K. 156–156v, 159–159v, 163–163v.*

hand is invisible, so it does not hold the stock under the barrel (which would be perfectly visible in the picture: Fig. 5). Such shooting was basically impossible and extremely dangerous for the user<sup>29</sup>.

While interpreting the scene in the painting (Fig. 2), it is important to take into consideration the military transformations of those days. In the picture each rank presents one activity, temporarily common for all. It is in accordance with the rule of volley fire application. The third rank of the unit (the first rank of shooters) fires a salvo at the Muscovy troops, the fourth

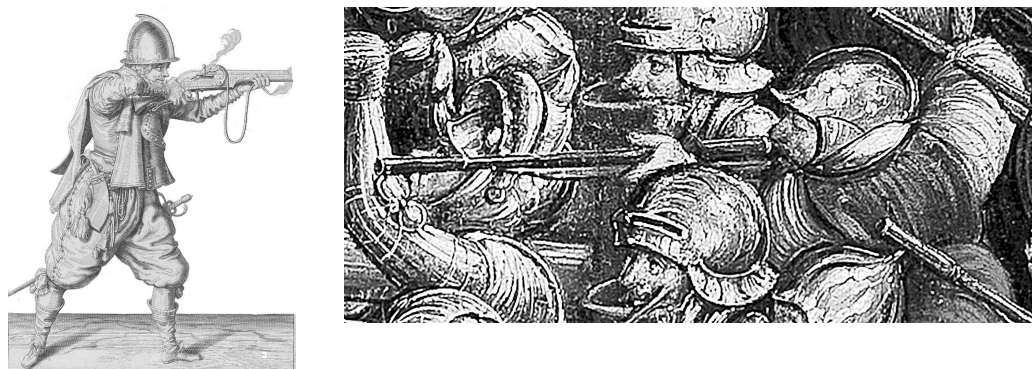


Figure 3. Shooting with an arquebus and a rusznica. Jacob de Gheyn, *Wapenhandelinghe van Roers Musquetten ende spiessen*, 's-Gravenhage 1607. Rijksmuseum, BI-B-FM-005-11 (public domain: <http://hdl.handle.net/10934/RM0001.COLLECT.453175>); The Battle of Orsha, The National Museum in Warsaw, inventory number MP 2475, published with kind permission from the museum

rank of the unit (the second rank of shooters) is at an advanced stage of gun loading, and the last rank at the initial stage.

What helps in interpreting the soldiers' behavior is a small (6-men) group of shooters standing near the river. Directly after crossing the river, they are depicted as performing various activities of gun loading, which are partly repeated in the scene with the defense of cannons by an infantry unit. Also, there the soldiers standing in similar positions as in rank 4 and 5, but they clearly have no one to shoot at along the parabola, since everywhere around them are only their own troops<sup>30</sup>.

Below we compare the action of the infantry recorded in the picture with plates of Jacob de Gheyn in the fundamental work first published in 1607, «*Wapenhandelinghe van Roers Musquetten ende spiessen*»<sup>31</sup>. We collate fragments of the picture with the engravings of arquebusiers, and not musketeers, since the presence of a furket considerably changes the

<sup>29</sup> See *Żygulski Z. jun. The Battle...* P. 126. — Zdzisław Żygulski explained this uncomfortable gesture of shifting the weapon from hand to hand with the artist's error or his *licentia poetica*. The sens of fire conducted according to the painter's concept would be absurd. The third and fifth ranks would shoot simultaneously, while the fourth would reload the weapon. A separate issue is the sens of plunging fire, which would be conducted intuitively by sheer luck, and the effectiveness of the bullets shot that way would be very low.

<sup>30</sup> Muzeum Narodowe w Warszawie, inventory number MP 2475.

<sup>31</sup> *Gheyn J. de Wapenhandelinghe van Roers Musquetten ende spiessen*. Gravenhage, 1607.



way the soldiers performed their actions. Of course, we realize that around 60 years of difference, as well as a different structure of those weapons, forced soldiers to use slightly different techniques. Nevertheless, the similarity is striking.

1) Firing an arquebus (in Gheyn) and firing a *rusznica* looks identical. A soldier holds with his right hand the buttstock, which rests on his chest and pulls the trigger with one finger. (This is not visible in the painting, but the position of the hand matches this assumption.) At the same time, they both hold the buttstock (there should be a fuse between the fingers), and in the painting the soldiers touch metal barrels with their thumbs. The process of aiming is emphasized by partially closing the left eye. In both situations, the weapon is hold parallel to the ground (Fig. 3).

2) Taking out a ramrod and pushing the gunpowder, the bullet and the buffer was represented in a very similar way. In both cases, the ramrod was held in the right hand, in Gheyn a little closer to the middle, due to which the move of the hand was less sweeping. In the painting it is accentuated that the *rusznica* was put on the ground (as with the landsknecht loading an arquebus in the engraving of 1540 by Sebald Beham<sup>32</sup>), in Dutch solutions it was held in midair. It is one of the last actions before firing a shot (Fig. 4).

3) In our opinion, in the fifth rank we can see blowing the match (fuse) at matchlocks or blowing through the touchhole, or else, the flash pan<sup>33</sup>. To perform those actions properly, it was necessary to put the weapon in your left hand, for the right was performing the most



Figure 4. Loading an arquebus and a *rusznica*.

Jacob de Gheyn, *Wapenhandelinghe van Roers Musquetten ende spiessen*, 's-Gravenhage 1607. Rijksmuseum, BI-B-FM-005-25, (public domain: <http://hdl.handle.net/10934/RM0001.COLLECT.453201>); *The Battle of Orsha*, The National Museum in Warsaw, inventory number MP 2475, published with kind permission from the museum

<sup>32</sup> Peterson H. L. *The Treasury of the Gun*. New York, 1962. P. 48.

<sup>33</sup> Several actions described by Gheyn were as follows: take the match (fuse) off the cock; put the match (fuse) away; raise the musket to the mouth, blow (dirt) off the pan; take the powder load; put the musket down; pour the powder on the pan. Cf.: *The Renaissance Drill Book*, Jacob de Gheyn / Ed. by D. J. Blackmore. London, 2003.

precise action, which was pouring gunpowder (the right hand was held the touch box). Taking into account the practice of placing the lock on the right side of the stock of the weapon, putting it on the right side of the soldier's body facilitated access to the mechanism of igniting the powder load. In the light of the Dutch instruction, the arquebus should be held with one hand in midair, whereas in the picture, in order to facilitate the activity, the buttstock rested on the left collarbone. Characteristically, two fingers of the figures in the painting (the thumb and the index finger) are at the lock, the other three support the weapon from below. This hand position makes it impossible to pull the trigger (Fig. 5)<sup>34</sup>.

The painting does not show directly the application of countermarch; all the actions are performed standing. We should reject the possibility of applying volley fire in a motion-

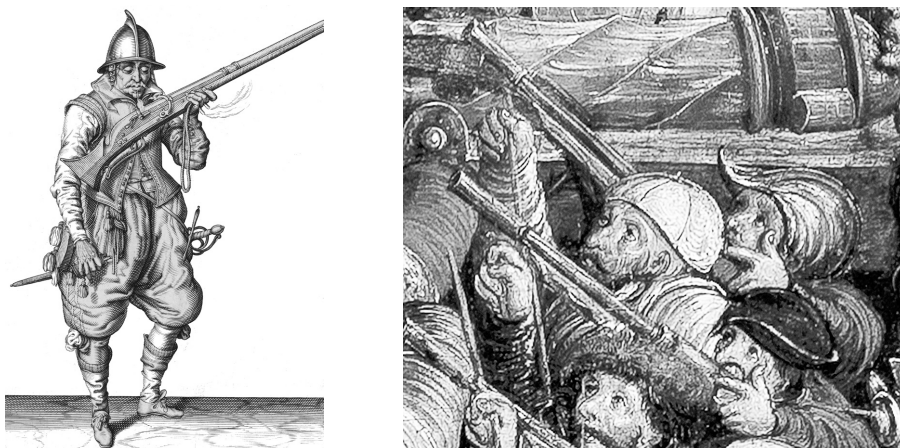


Figure 5. Jacob de Gheyn, *Wapenhandelinge van Roers Musquetten ende spiessen*, 's-Gravenhage 1607. Rijksmuseum, BI-B-FM-005-15, (public domain: <http://hdl.handle.net/10934/RM0001.COLLECT.453186>); *The Battle of Orsha*, The National Museum in Warsaw, inventory number MP 2475, published with kind permission from the museum

less formation, as proposed by Tarnowski. Such shooting would not be possible, since in front of the shooters were two ranks: the pikemen and the pavesarii (shield bearers). Thus, there must have been a form of countermarch. To fire a shot, it was necessary to come up to the pavesarii and take a position between them. This requires a move forward, and then a step leftwards, or a diagonal move to the left, heading for a gap between the soldiers in the second rank. His solution is also indicated by the distance between the third and the second rank, which suggests that having fired a shot, the ranks were moving (Fig. 2).

Collating the observations of Tarnowski, Zebrzydowski, and the iconographic message of the painting «The Battle of Orsha» considerably integrates source records noted in the introduction to this article. The examples confirm the common application of different forms of volley fire in Europe in the mid-16<sup>th</sup> century, and demonstrate that the solution was widespread as early as the first half of the century. Polish sources are close to the observations of

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<sup>34</sup> We accept a possibility that the soldiers are performing an initial action necessary to load arquebuses which we do not know.

researchers of Turkish military. A Turkish miniature illustrating the battle of 1558 (in the year of the publication of Tarnowski's book) shows shooters in two ranks, the first of them kneeling on one knee. The soldiers are busy loading the guns, while the second rank is shooting over their heads (exactly as expected by Tarnowski). Another iconographic source referring to the Battle of Esztergom (Hungary) in 1605, represents three ranks of shooters, who, according to Gabor Agoston, are firing in the West European style<sup>35</sup>.

There are probably differences between the art of war in Central and Western Europe versus Southern and Eastern Europe. While in the West the loading was in standing position, which forced applying certain forms of countermarch (the evidence of which is the message of the painting *The Battle of Orsha*), in other lands, the tradition of loading in kneeling position was present. The former solution was undoubtedly much more complicated; it required well-trained soldiers, whereas the latter did not force soldiers to move and was relatively simple (however, it required the shooters to come up to the gaps between the infantrymen with pikes and shields). Military transformations, first and foremost the lengthening of firearms and finally the emerging of muskets, resulted in the tactical superiority of the former solution. Despite the technological transformations, the knowledge of reloading firearms in kneeling position persisted. The evidence thereof is the treatise on military drill by the Italian Bonaventura Pistofilo (b. 1576) in his work «*Oplomachia*», where the author clearly states that a soldier in difficult field circumstances, where it is impossible to apply countermarch, kneels in order to load the gun and thereby unblocks the field of fire for the shooter standing behind him<sup>36</sup>.

We believe that volley fire is a perfect example of interpenetration of ideas in the vast tracks of the Eurasian continent. We underscore the temporal convergence of Tarnowski's treatise and the painting under analysis with the Chinese work of Qi Jinguang published in 1560 («*Ji xiao xin shu*»). He proposed that soldiers waited for the order of the officer commanding the fire and opened fire only from the distance of 100 steps. The fire was initiated by the sound of a bamboo pipe and the shot of the commander. Simultaneously, having fired the shot, the rank was to give up to another which was waiting with the loaded weapons<sup>37</sup>.

We obviously realize the existence of the cultural distance separating Europe and Near East from the Chinese state, but the temporal convergence of volley fire spreading is striking. The idea of conducting such fire combat was apparently available at a certain moment (c. mid-16 century) for all civilizational circles having firearms<sup>38</sup>. It was possible due to mutually independent inventions, but military influences connected with waged wars are more probable. The process was probably based on the rule of cultural diffusion and not as a result of a top-down state reform.

Attempts to intensify the effects of fire conducted by shooters took different ways but aimed at achieving the phenomenon of volley fire. Thanks to this, efforts were made to avoid

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<sup>35</sup> *Agoston G.* Firearms and Military Adaptation: The Ottomans and the European Military Revolution, 1450–1800 // *Journal of World History*. 2014. Vol. 25. No. 1. P. 97–98; see also: *Börekçi G.* A Contribution... P. 420 (image 1), 432 (image 2).

<sup>36</sup> *Pistofilo B.* *Oplomachia*. Siena, 1621. P. 246, 247. Fig. 25.

<sup>37</sup> *Andrade T.* 1) *The Arquebus*... P. 123–124; 2) *The Gunpowder*... P. 173–174.

<sup>38</sup> There is still a lack of information about the use of volley fire in the Tsardom of Russia. In view of the intense wars in the Inflants, the application of this innovation in the 16<sup>th</sup> century seems almost certain. However, this problem requires further research. Cf.: *Filjushkin A.* *Livonian War in the Context of the European Wars of the 16<sup>th</sup> Century* // *Russian History*. 2016. Vol. 43. No. 1. P. 15–16.

a one-off salvo, which would have deprived the unit an opportunity of further distance combat. The new concept also sought to maximize a psychological effect. A separate issue is the course of the process and the form of its intermediate stages. As demonstrated above, in the case of the Polish army it was probably an early form, since it did not include the movement of the formation. The painting *The Battle of Orsha*, on the other hand, may show that there had been practical experience with the application of countermarch much earlier, before the Dutch reforms. For isolating three ranks of shooters is analogous with the depiction of the Spanish treatise by Martin de Eguiluz «*Milicia, discurso, y regla military*». The author recommends to select a self-possessed and experienced commander of the unit of shooters, well-oriented in the structure of the enemies' troops. A salvo was to be fired subsequently by three ranks of soldiers (five men standing in a row). The author introduces an element of a maneuver, ordering the first rank after the shot to turn sideways to the enemy and march to the back of the formation, in order to unblock the field for the second rank (in the picture it is seven men). The soldiers of the first rank were to start loading the weapon, holding the lit fuse at the ends and five-six bullets prepared

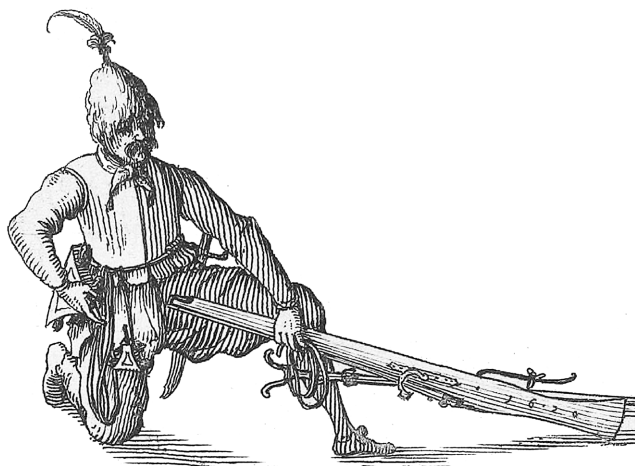


Figure 6. Reloading a musket in kneeling position.  
Pistofilo, Bonaventura. *Oplomachia*.  
Siena: Hercole Gori, 1621. P. 247.

in the mouth<sup>39</sup>. Having loaded the rifles, they were to wait for the command of the officer to fire another salvo, incessantly observing the enemy. The author also noted that firing the third salvo did not conclude the whole process. The unit could have fired even twelve salvos, which means that each rank could have fired four times<sup>40</sup>. A far more advanced method was practiced by the Dutch at the end of the 16<sup>th</sup> century; they experimented with six and more ranks. Thanks to that it was possible to fire salvos much more frequently, which increased the combat value of the unit and enhanced the psychological effect<sup>41</sup>.

The key question, then, is not about the idea of volley fire — it was applied nearly wherever firearms appeared — but the means of its application. Much as an inevitable consequence of the common use of firearms and the necessity to maximize the fire effect was introducing

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<sup>39</sup> The interesting question of putting bullets into mouths and their storing was not noted in de Gheyn's treatise. However, the tradition of this solution existed for very long, the evidence of which is the oldest Polish infantry regulation published in 1648. In those days an initial action before the fight was the order to put in the mouth six bullets: *Lipowski B.* *Piechotne ćwiczenia albo wojenność piesza*. Kraków, 1660. K. B3; *Wimmer J.* *Błażeja Lipowskiego pierwszy polski regulamin piechoty // Studia i Materiały do Historii Wojskowości*. 1976. Vol. 20. P. 349.

<sup>40</sup> *Eguiluz M. de Milicia...* P. 69; cf.: *Andrade T.* *The Gunpowder...* P. 147–148; *Hernández A. J. R.* *Breve historia...*

<sup>41</sup> *Parker G.* 1) *The Limits...* P. 338–358; 2) *Od domu...* P. 220–226, 229–232.

the tactics of volley fire in the mid-16<sup>th</sup> century, rearming soldiers with long-barrel muskets forced developing the tactics of countermarch at the end of that century. On the basis of the examples referred to, we can conclude that the solution was simultaneously applied by the Spanish army and the Dutch army. The difference consisted in the fact that the Spaniards (and the Poles) seemed to base on the so-called soft interaction (example and persuasion of experienced officers) as well as the popularization of theory in military treatises. On the other hand, the Dutch reached for systemic solutions — centrally organized trainings in drill and shooting, as well as military regulations. In the long run this method turned out more effective.

#### Информация о статье

Статья написана в рамках исследовательского проекта Национального научного центра SONATA, no. 2016/23/D/HS3/03210 «The military revolution as a modernization factor in the public finance and state organization of the Polish-Lithuanian state in the comparative perspective».

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**Заголовок:** Volley fire in Europe in the mid-16<sup>th</sup> century [Залповый огонь в Европе в середине XVI века]

**Резюме:** В статье рассказывается об использовании залпового огня в европейских армиях в середине XVI в. На основании источников польского происхождения авторы установили, что в 1558 г. польская пехота использовала залповую стрельбу. Также известно, что командирами каждые несколько дней проводились тренировки по усовершенствованию командной стрельбы. Стрельба велась по-турецки, когда в одной шеренге большое количество людей после того, как выстрел был произведен, синхронно становилось на колено и заряжало оружие в этом положении. В то же время использованный в статье рисунок «Битва при Орше» (созданной в 30–40-х гг. XVI в.) показывает западноевропейскую манеру ведения боя пешим отрядом. Она предполагала выстраивание в три ряда стрелков и попеременную стрельбу по позиции противника, с одновременным проведением контрмарша. Это позволяет утверждать, что данный метод, впервые описанный испанцами в 1592 г., получил широкое распространение на полвека раньше. Использованные в статье источники указывают на то, что в середине XVI в. залповый огонь был известен на обширных территориях Евразии — от далекого Китая, через Османскую Порту, до западной части Европы. Разница заключалась в способе ведения залпового огня, при этом наиболее эффективный вид огня, используемый во время сражений, был изобретен голландцами в 1690-х гг. Предложенный Яном Тарновским метод заряжания огнестрельного оружия в положении «стоя на коленях» из-за увеличения размера оружия и использования мушкетов все более и более устаревал.

**Ключевые слова:** залповый огонь, военная революция, контрмарш, Ян Тарновский, военное искусство XVI в., тактика XVI в., подготовка солдат

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**Title:** Volley fire in Europe in the mid-16<sup>th</sup> century

**Summary:** The article explores the application of volley fire in European armies in the mid-16<sup>th</sup> century. On the basis of Polish sources, the authors established that shooting volleys was applied by Polish infantry in 1558. There was also training in collective loading and shooting conducted by a commander every few days. Fire was conducted in the Turkish manner, i. e. having fired a salvo the rank would kneel and load the weapon in this position. The painting referred to in the article «The Battle of Orsha» (created in the 1530s or 1540s) shows the West European manner of conducting combat by an infantry unit. It involved setting the shooters in three ranks and alternating firing at enemy positions with a simultaneous countermarch. This suggests that the method described for the first time by the Spanish in 1592 was spread half a century earlier. The sources show that in the mid-16<sup>th</sup> century, volley fire was known in vast Eurasian tracks from remote China, through the Ottoman Empire to the western ends of Europe. The difference lay in the way of conducting the volley fire, and the most effective form of fire applied in battles was invented by the Dutch in the 1590s. As a result of the enlargement of weapon size and the introduction of muskets, the method proposed by Tarnowski of loading firearms in kneeling position became increasingly obsolete.

**Keywords:** volley fire, military revolution, countermarch, Jan Tarnowski, military of the 16<sup>th</sup> century, tactics of the 16<sup>th</sup> century, soldiers' training

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