ARMS RACE ON THE HABSBURG-OTTOMAN BORDER IN THE 16TH CENTURY: ARSENALS, SMALL FIREARMS, ARTILLERY AND AMMUNITION ON THE CROATIAN AND SLAVONIAN MILITARY BORDER

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ABSTRACT

The paper reconstructs the development of the system of storage, distribution and management of arms and ammunition on the Croatian and Slavonian Border, systematically presents and comments data from the register made in Vienna at the end of 1577, and analyses proposed changes in the context of the military history of the region.

In the 1540s the Habsburgs started to significantly improve the organization and functioning of the Military Border / Military Frontier on the Croatian, Slavonian and Hungarian soil. The establishment of the Aulic War Council in Vienna followed in 1556. Intense negotiation of Habsburgs and their (mainly Austrian) Estates over the finances and organization of the defence started in the 1570s. Debates culminated during the Viennese Assembly in 1577 and the general diet of Inner-Austrian estates in Bruck an der Mur in 1578. The first discussed an entire Military Border, while the latter focused on the Croatian and Slavonian Border.

The highest court dignitaries and military experts led by Lazarus von Schwendy (imperial councillor and *Obristfeldhauptmann*) and representatives of the Austrian and Czech estates assembled in Vienna in 1577 with one goal – to thoroughly reform and improve the defence system that stretched from the Adriatic Sea to Transylvanian border. In order to prepare the participants and warrant meaningful and focused discussion, the commanders of six border sections were appointed to collect, systematize and deliver information on infrastructure, logistics and finances of their respective sections and Ottoman military infrastructure facing them. The commanders were also required to suggest improvements in quantitative and qualitative terms. Thus, unprecedented serial data on the Military Border was gathered. These materials, along with important discussions on strategy and tactics were collected in one volume (c. 730 p).[1]

[1] *Haubt Beratschlagung vber Bestellung der Hungrischen, Windischen vnd Crabatischen Granitzen vnd deren zuegehörigen Notturfften, Wie die auf beuelcich der Rom. Kay. Mtt. etc. vnsers aller-*

Valuable part of this volume is the register of existing weaponry and ammunition on an entire Military Border made in final quarter of 1577. Part of this register discusses Croatian and Slavonian Borders. The register also includes detailed proposals on how to improve quantity and quality of arms and armament in each border section. Proposals were based on everyday needs, battle experience and intelligence reports on the Ottoman weaponry.[2]

1. ARMOURIES ON THE CROATIAN AND SLAVONIAN MILITARY BORDER

The 16th century arsenals (*Zeughaus*) were a major improvement in comparison to medieval armouries (*Rüstkammer*). In step with technological development and expansion of firearms, arsenals stored and even produced new types of small arms, artillery and ammunition, employed an entire spectrum of experienced professionals and supervised and supplied arsenals/armouries and storages in border fortresses. Due to the long-lasting war against the Ottomans, their importance and responsibilities grew.

As part of its military reforms in 1503 Emperor Maximilian I (1493-1519) created the office of the Chief Arsenal Officer (*Oberstzeugmeister*) who was stationed in Vienna and was responsible for the logistics of an entire Hungarian military frontier. After 1577/1578 his authorities were reduced to four Hungarian generalcies.[3]

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gnedigisten Herrn zu Wien im August vnd September des 1577 Jares gehalten, durch Irer Mt. etc. Kriegs Secretarien Berhnardten Reisacher verfasst vnd dan im October, Nouember vnd tails December Irer Mt. auf dise Form fürbracht worden. Vienna, Kriegsarchiv, Alte Feldakten (further KA, AFA), 1577-13-2, 367 fol. See also: István Geőcze. "Hadi tanácskozások az 1577-ik évben." in *Hadtörténelmi Közlemények*. Year 7, No 1 (1894), 502-537.

2 KA, AFA, 1577-13-2, 232v-245v. The Croatian-Slavonian part of the Viennese register was made on the basis of the inventory sent to Archduke Ernest by Archduke Charles on August 30, 1577 (published in: Radoslav Lopašić. *Spomenici Hrvatske krajine*. Vol 1. Zagreb, 1884, 41-44). The published inventory contains half of the data presented in the Viennese one. Also, the numbers do not match up completely (both due to transcription errors and due to subsequent changes made by the Viennese councillors). Fleeting and partial summaries of Viennese and Charles's registers in: Milan Kruhek. *Krajiške utvrde i obrana Hrvatskog Kraljevstva tijekom 16. stoljeća (Military Border Fortresses and the defence of the Croatian Kingdom in the 16th Century)*. Zagreb, 1995, 259-265, 274-275.
The register was partially used in: Nataša Štefanec. *Država ili ne: ustroj Vojne krajine 1578. godine i hrvatsko-slavonski staleži u regionalnoj obrani i politici (State or Not. Organization of the Military Border in 1578 and Croatian-Slavonian Estates in Regional Defence and Politics)*. Zagreb, 2011, 243-244, 378-380 et passim. Štefanec also analysed in detail the Inner-Austrian Diet in Bruck an der Mur (1578).

3 General information on the development of arsenals on Austrian territory and on the Military Border in: Géza Pálffy. "The Habsburg Defense System in Hungary Against the Ottomans in the Sixteenth Century: A Catalyst of Military Development in Central Europe." in Brian J. Davies, ed. *Warfare in Eastern Europe, 1500-1800*. Brill. Leiden-Boston, 2012, 35-61, here 53-56. Prior to 1503, the officer was called *Hauszeugmeister*. Vasko Simoniti. *Vojaška organizacija na Slovenskem v 16. stoletju (Military Organization in Slovenia in the 16th Century)*. Ljubljana, 1991, 188.

In December 1578 the office of the *Innerösterreichischer Oberstzeugmeister,* responsible for the Croatian and Slavonian borders started to function. Namely, Archduke Charles discharged his personal Chief Arsenal Officer (*Oberstzeugmeister*) and Styrian estates readily transferred this office into the *Hofkriegsstaat*, which was financed from the Military Border treasury.[4] Chief Arsenal Office and the main arsenal (*Zeughaus*) were located in Graz, the capital of Styria. The office supervised subordinate offices on the Slavonian and partly on the Croatian Border. Another crucial Inner-Austrian arsenal was situated in Ljubljana.[5]

Largest arsenals in Habsburg defensive system, financed jointly by the emperor and the estates, were located in Vienna, Graz, Ljubljana, Gorizia, Linz, Innsbruck, Prague, Brünn and Wiener Neustadt. During the 16th century, arsenals were established on the frontier from the Adriatic Sea to border of Transylvania, in Karlovac, Varaždin, Kanizsa, Györ, Kassa, Érsekújvár and Szatmár. Among them, the arsenal in Kassa was comparable to largest imperial arsenals in Innsbruck, Vienna and Graz: "it was a military workshop with a gun foundry, gunpowder mill, various workshops and even a boat-building facility." In charge of the Kassa arsenal was the Upper Hungary Deputy Chief Arsenal Officer (*Oberstzeugmeisterleutenant in Oberungarn*) appointed from 1567, on the advice of Lazarus von Schwendy.[6]

The functioning of the office of Inner-Austrian Chief Arsenal Officer (*Obristen Zeugmeister*) responsible for the Croatian and Slavonian Military Border was discussed at length in January and February of 1578, at the general diet of Inner-Austrian estates in Bruck an der Mur. The improvement of artillery affairs was one of the focal points of discussion in Bruck:

> *Zu Nothwendiger fürsöchung der gränizen, auch erhaltung Landt, vnd Leuth, ist hoch vonnöth[en], das man das Artiglerie weßen zum Bösten Befürdere*.[7]

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[4] Viktor Thiel. "Zur Geschichte der innerösterreichischen Kriegsverwaltung im 16. Jahrhunderte." in *Zeitschrift des Historischen Vereines für Steiermark*, Jahrgang 12 (1914), 159-170, here 169. See also: Viktor Thiel. *Die innerösterreichische Zentralverwaltung 1564-1749. I. Die Hof und Zentralbehörden Innerösterreichs 1564-1625*. Vienna, 1916, 58.

[5] The organization of the arsenal in Ljubljana: Simoniti, 1991, 180-199; Vasko Simoniti. "Cesarska (deželnoknežja) orožarna v Ljubljani." in *Kronika. Časopis za slovensko krajevno zgodovino.* No. 36 (1988), 159-168.

[6] Citation from: Pálffy, 2012, 54. On the arsenal (*Zeughaus*) in Kassa (Košice, Kaschau): Géza Pálffy. "Kriegswirtschaftliche Beziehungen zwischen der Habsburgermonarchie und der ungarischen Grenze gegen die Osmanen in der zweiten Hälfte des 16. Jahrhunderts. Unter besonderer Berücksichtigung des königlihen Zeughauses in Kaschau." in *Ungarn Jahrbuch*. No. 27 (2004), 17-40, here 28-31.

[7] *Uniuersäl Landtag So Ihr Fürstl: Durchl: Erzhörzog Carl mit Steyer, Kärnten, Crain, vnd Görz, zu Prugg an der Muehr gehalten im 1578 Jahr* (265 fol). Graz, Universitäts Bibliothek, Manuscripten Sammlung, Graz, MS 432. (further: Graz, UB, MS 432), 35r.

At the diet, Michael Rindsmaul was confirmed as the Chief Arsenal Officer. Rindsmaul was running the artillery affairs already in 1565.[8] Thiel states that the Archduke Charles appointed Rindsmaul as *obersten Zeugmeister* in *allen fürstentumben und landen* in 1565, without the arrangement with the estates. The Archduke preferred Rindsmaul. He appointed him as an *Oberstfeldzeugmeister* when he took over the command of Inner-Austrian troops after the failed anti-Ottoman campaign in the mid 1560s. Rindsmaul wanted to resign in 1574 but eventually remained in office. In 1578 he was again asking to be released from service, but there was apparently no adequate substitution. The Inner-Austrian Estates urgently decided to convince him to stay a little longer and the Archduke agreed. He remained until 1580 when he was replaced by Christoph von Teuffenpach as *Hofkriegsrat* and *Oberstzeugmeister* (the two offices were thus connected). In 1584, the finances of the Aulic War Council (*Hofkriegsstaat*) were reduced and a yearly sum of 300 rhenish guilders (further f)[9] was reserved for the office. In July 1585 Julius von Sara succeeded Teuffenpach but Sara was not an Aulic War Councillor. From that point on, The *Oberstzeugmeister* was subordinated to the Aulic War Council in Graz only in matters of Military Border arsenals (*Zeughäuser*), but in all other affairs he was responsible to the Archduke's Aulic Chamber, as before. The Chief Arsenal Office had a treasury in the 1560s – from 1567 it was directed by Joachim von Trautmanstorff. After he died the treasury was run by the Chief Arsenal Officer himself.[10] This development shows the intermittent nature of the system which is typical of early modern period – the functioning of the office strongly depended on individual capability, influence and charisma. However, it also shows that the basic structure of the office existed for decades.

At the diet in Bruck, the estates declared that the Chief Arsenal Officer needs to be better supported in his work. They proposed the introduction of three arsenal assistants or officials (*Zeugdiener*) that should be recruited among qualified and experienced Inner-Austrian noblemen (*von Adl, Landt-Leuth-Khünder*). Promotion of Inner-Austrian noblemen through military offices was a standard strategy that was supposed to reimburse part of huge defence expenses to Inner-Austrian estates. The novelty was the introduction of three instead of one assistant (*Zeugdiener*) to the Chief Arsenal Officer. The Estates also proposed that 15 gun-masters (*Pixen Meister*) with the yearly pension of 32 f should be accommodated in cloisters (*Clöster*) and instructed how to behave appropriately.[11]

8 KA, AFA, 1565-7-ad11-Litt:a.

9 Rheinischer Gulden, florenus Rheni, abbrev. f. One guilder was valued at 60 Kreuzer (*Kreutzer*, kr) in the 16th c.

10 More in: Thiel, 1914, 159, 168-170, citation 169.

11 Graz, UB, MS 432, 35r-35v, 99v, 150r.

Archduke Charles supported the reorganization of the office, employment of additional officials from the ranks of the Austrian nobility and negotiations with Rindsmaul. He confirmed that initial 50.000 f should be instantly delivered for the purchase of arms and ammunition. He agreed that one should increase spendings on the arsenal in the future. The Archduke requested from the Chief Arsenal Officer to be present in Graz as much as possible and to keep the arsenal in good order.[12] In December 1578 it was decided that one of the newly employed three assistants should function as the treasurer of the office. However, in spring 1584 the personnel was reduced – of the three one remained as *Zeugdiener* in the Chief Arsenal Office and one as secretary (*Zeugschreiber*).[13]

Subordinated to the Chief Arsenal Office in Graz were the border armourers (*Zeugwart*) and gun-masters (*Püchsenmeister*).[14] They were distributed in fortresses on the Military Border and sometimes joined by random officials called *Zeugverwalter*. Both positions were well paid in comparison to elite units as harquebusiers (8 f), *Deutsche Knechte* (5-6 f) and hussars (4-6 f).

On the so called Styrian and Slavonian Border (from the 1560s Slavonian Border), the office of border armourer (*Zeugwart*) and his men (*Püchsenmeister*) could be traced already from the mid 1550s, while the first trace of similar structure on the so called Old and New Carniolan and Croatian Border (from the 1560s Croatian Border) was discernible only in the mid 1570s.

In 1556 the arsenal of the Styrian and Slavonian Border had one armourer (*Zeugwardt*) Bartlmee Weiss, paid 12 rhenish guilders (f) per month, and 12 gun-masters (*Pixenmeister*). Michel Paumgartner (10 f) and Paull Peödl (10 f) were located in Đurđevac, Hannsen Mor (10 f) and Thoman Friess (10 f) in Koprivnica, Hanns Chrafft (10 f) in Križevci, Hanns Stainmez (10 f), Jeörg Rächigkh (8 f), Hanns Pücshaimer (8 f) and Banngräz Posch (8 f) in Varaždin, Hannsen Schwertferber in Hrastovica (8 f), Lucaβ Fux (8 f) in Sisak, while Jurco Chrainer (8 f) was not allocated. Monthly spending on all of them was 120 f.[15]

One of the largest armories was in Varaždin. In 1559, the armourer in Varaždin and his men responsible for the Styrian and Slavonian Border were paid 142 guilders per month.[16] In 1565 there was one armourer and 12 gun-masters on the Slavonian

[12] Graz, UB, MS 432, 35r-35v, 99v, 150r. Štefanec, 2011, 378-380. *Landeszeughaus* in Graz is amongst the largest early modern armouries/museums in the world (https://www.museum-joanneum.at/landeszeughaus/historische-waffenkammer).

[13] Thiel, 1914, 159, 169-170.

[14] Thiel, 1916, 58; Kruhek, 1995, 288; Štefanec, 2011, 243.

[15] Graz, StLA, Laa. A., Antiquum, XIV, Militaria, Sch. 22, 1556/4, 1556-X, sd - 1556-XI-sd. Valuable data on the Varaždin armoury and Dominico Conduto collected in: Mira Ilijanić. "Varaždinska oružana i njen inventar." in *Godišnjak Gradskog muzeja Varaždin 2-3* (1962-1963), 31-44.

[16] KA, AFA, 1559-7-ad7.

Border that costed 128 f per month.[17] In 1573, the arsenal of the Slavonian Border had one main armourer located in Varaždin and 13 gun-masters paid altogether 120 f per month.[18] In August 1577 we find similar distribution registered in the muster list, which further confirms the principle. *Zeugwart* was Dominico Conduto (Conduta), located in Varaždin and paid 16 guilders per month. Gun-masters in Đurđevac were Georg Enlich (11 f) and Dauidt Khemetter (10 f), in Koprivnica Michell Schmidtperger (11 f) and Anndre Khlueg (10 f), in Križevci Marttin Ytsch (10 f) and Michall Selnitsch (8 f), in Varaždin Hannß Rodenstokh (8 f), Leonhardt Moßplaser (8 f), Christoff Hörman (8 f) and Georg Rohnikh/Rahnikh (4 f), in Ivanić Hanns Pannzermaher (8 f) and in Sisak Lucas Fux (8f). Expenses per month remained the same, 120 f.[19] At the end of 1577, the situation was the same and it was suggested not to change it.[20] At the beginning of March 1578 it was decided to maintain one Slavonian armourer in Varaždin and 13 gun-masters (*Püchßenmaister*). They should be paid 120 guilders per month as before, but distributed somewhat differently than before: *Zeugwart* and two *Püksenmeistern* in Križevci, one *Püksenmeister* in Cirkvena, two in Ivanić, three in Koprivnica, two in Varaždin, two in Đurđevac and one in Zagreb.[21] The changes reflected slight tactical alterations on the border but the principle remained the same.

On the Croatian Border, the development of the similar structure was rather late. Croatian Border was supplied from the arsenal (*Zeughaus*) in Ljubljana. It was run by the Carniolan armourer (*Zeugwart*) who also supplied entire Carniola. He was appointed by the Carniolan estates and the Archduke, and was responsible to the Chief Arsenal Officer in Vienna, later in Graz. The armourer from Ljubljana supplied weaponry to the border at the behest of the emperor, the archduke and the Carniolan estates (see appendix 1). The heavy and more valuable pieces of artillery used to be borrowed to the border and, afterwards, returned to Ljubljana.[22] Transfers were executed in direct agreement with the commander of the Croatian Border. Interestingly, the Chapter of Zagreb which defended narrow territories between the Croatian and Slavonian Border was purchasing weaponry for Sisak in Ljubljana throughout the century. When Karlovac was built later on, it was partly supplied from Ljubljana, but mainly from Graz.[23]

Although commanders of the Croatian part of the border attempted, from the 1520s, to improve their arsenals and the network of arsenal officers, the development

17 KA, AFA, 1565-1-ad2-Litt:c

18 KA, AFA, 1573-6-1, 5v.

19 Graz, Steiermärkisches Landesarchiv, Laa A., Antiquum, XIV, Militaria, Sch. 48, 1577/2, 1577-VIII-24; Štefanec, 2011, 380.

20 KA, AFA, 1577-13-2, 64v-65r, 71r.

21 Graz, UB, MS 432, 76r; KA, AFA, 1578-3-1-1/2.

22 Simoniti, 1991, 187. List of 16th century armourers in Ljubljana in: Simoniti, 1991, 189.

23 Simoniti, 1991, 186-187.

was slow. In 1527, imperial commander in Croatia Nikola Jurišić proposed the appointment of arsenal officer (*Zeugmeister*) and one gun-master (*Puchsenmeister*) for maintenance and repairs of firearms to Bihać, which was the most important and protruded fortress on the border. Jurišić also proposed to provide Bihać with 3 falkonets, 100 hook-guns, gun-powder and ammunition. Neighbouring Ripač should have been provided with one canon and 30 *Hackenpuchsen*.[24]

Eventually, in Bihać, as well as in other main fortresses on the border like Rijeka, Senj, Otočac, Ogulin and Hrastovica, storages and even small armouries were built. Armoury in Bihać was even repaired, by the commander of the Croatian Border Jobst Thurn in 1584.[25] In border fortresses supplied directly from Ljubljana mostly gun-masters (*Püchsenmeisters*) were appointed to take care of the weaponry. In absence of specific armourer for the Croatian Border, they were responsible directly to the border commander. Still, it was difficult to find a proper, experienced and knowledgeable gun-master. In the 1560s, the commissioners on the Croatian border recommended to the Archduke to replace some of them who were too old to work, and to provide them with provision and accommodation in imperial asylum in Ljubljana.[26]

From the 1570s, there was an obvious effort to improve the storage and distribution of firearms on the Croatian Border too. We find one main *Zeugwart* included into the headquarters of the Croatian Border in 1576 (*Auf ein Zeugwarch Monatlich 24 f)*.[27] In the payroll from 1577 there is again no such officer in Croatia, but the advice was given to include one into the headquarters (24 f monthly).[28] Finally, in March 1578, it was ordered to introduce one armourer (*Zeugwart*) to *stadt* Senj for 12 f per month and to locate three gun-masters (10 f monthly each) into Senj city and new fortress Nehaj. One armourer and gun-master in the same person (12 f) was assigned to Bihać, as well as two more gun-masters (10 f).[29]

For a long time, the main armourer (*Zaugwart*, *Zuigbardt*) on the Slavonian Border was Dominico Conduto, a rather famous Italian, who was employed from the 1560s and stationed in Varaždin. Already in 1568 he was compiling inventories of received and issued arms and ammunition in poor German.[30] His duties included distribution of tools, arms and ammunition across the border section, organization of arduous transport, mainly by horses, of heavier pieces of artillery and equipment to individual fortresses, repairs of artillery, carriages, wheels etc.

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24 Kruhek, 1995, 83.

25 Kruhek, 1995, 325.

26 Simoniti, 1991, 186, 190, 192.

27 KA, AFA, 1576-12-2, 1r-13v, here 1r-1v; Štefanec, 2011, 205.

28 KA, AFA, 1576-12-2, 73r-86r, here 80r.

29 KA, AFA, 1578-3-2.

30 For example: KA, AFA, 1578-7-ad6-d.

Armourers (*Zeugwart*) of border sections, from Kassa to Karlovac (from 1579) and Varaždin had to supply and supervise a number of fortresses in their domain. Transparent hierarchy was devised in 1577. Main fortresses on the Slavonian Border were Varaždin, Križevci, Ivanić, Zagreb (and Sisak). Paraphrasing the register, from Varaždin, which is the headquarters of the Slavonian Border, one should support following places and castles (*heusser vnnd Castl*): Remetinec, (Varaždinske) Toplice, Ludbreg, Rasinja. From Koprivnica five places (*heusser*): Đurđevac, Prodavić, Drnje, Novigrad, Đelekovac. From Križevci 11 places (*Ort*), Grabovac, Gradac, Sv. Peter, Cirkvena, Church of St. George prior to Križevci, fortress (*Schloß*) in Kamnik mountain, Glogovnica, Apatovac, Topolovac, Sv. Ivan and Tram. From Ivanić five castles (*Castellen*): Kloštar Ivanić, Lupoglav, Božjakovina, Gofnic and Sveti Križ. Zagreb - "which is also the capital city and border city is situated at a place that has good correspondence with Slavonia and Croatia" – should support following seven fortresses (*heusser*): Bisag, Novigrad na Savi, Hrastilnica, Rakovec, Lovrečina, Čejnova and Hum.[31]

Main storages of arms on the Croatian Border in 1577 were Hrastovica, Bihać, Senj and Ogulin. In words of the register, Hrastovica, which actually had two fortresses, is situated towards Slavonija, on the river Sava. It should supply 12 places (*Ort*): Blinja, Vinadol, Bojna, Gora, Ajtić, Mašin ili Dugišiman castle, Greda, Mutnica, Srednji Gradac, Gornji Gradac, Zrin, Gvozdansko. Bihać is situated on an island on the river Una, in the centre of the Croatian Border but protruded towards the enemy. It should provision 25 fortresses: Repić, Sokol, Drežnik, Tržac, Slunj fortress and town (*Schloß vnnd Marckt*), Cetin, Izačić, Toplički Turanj, Brekovica, Ostrožac, Kremen, Hojsića most, Kaštel Blagajski, Hresno, Gornja Kladuša, Donja Kladuša, Sv. Juraj in Ostrožac forest, Podzvizd, Peć, Šturlić, Vranograč, Perna, Kneja. Senj is located on the Adriatic coast. It should supply Ledenice, Brinje, Brlog, Otočac, Prozor, Dabar, Jesenice and Bag. Ogulin is located in the hinterland, towards Carniola. It should provision six fortresses (*heusser*): Modruš, Plaški, Svetice, Sv. Juraj, Tounjska Peć, Ključ.[32]

Relation of main arsenals towards filial fortresses changed with years, in accordance with the modification of captaincies. From 1579, Karlovac became the headquarters of the Croatian Border. It accommodated the largest arsenal supplied mainly from the main arsenal in Graz.

Arms and ammunition, especially gunpowder, had to be stored in dry place, in rooms covered with roof, which was not an easy task to accomplish for border officers. Reports on the abysmal state of fortresses and their storages are numerous.[33] Due to insufficient organization of the artillery affairs on the Croatian Border and

[31] KA, AFA, 1577-13-2, 232v-245v.

[32] KA, AFA, 1577-13-2, 232v-245v.

[33] Štefanec, 2011, 392-450.

higher frequency of Ottoman attacks, problems with arms, storages, moisture and explosions were more imminent in Croatia than Slavonia. For example, in a petition to the Emperor in 1530, citizens of Bihać, which was the central fortress in Croatia mention that Bihać is supplied only by 3 smaller artillery pieces and three mortars for signalling.[34] In summer 1577, wheels on artillery carriages in Bihać were rotten and one could hardly transport the artillery to surrounding fortresses.[35]

Transport of arms through wild and deserted border terrain led to agonising difficulties magnified by the absence of roads, high costs and Ottoman threat. For example, on October 26, 1552 Jacob von Lamberg zum Stein wrote to Maximilian from the meeting of delegates of three hereditary lands with border commanders (*Obrister Hauptleut und Leutenandt*) in Zagreb. Lamberg received unsettling news on the Ottoman advance and was calling on the emperor to order Carniolan *Vizedom* to deliver the arms and ammunition from the arsenal in Ljubljana, where large amounts were stored and unused, to the chief commander Lukas Székely.[36] In November 1552, Styrian councillors, prompted by the emperor, ordered 5 pieces of *puchsen* to deliver them to Lukas Székely. Three had to be delivered to Varaždin and two to Sisak, but eventually it could not happen. Herberstein reported that the land from Varaždin to Sisak was:

> ... scourged and desolated, without roads. Consequently, it is not possible to transport weapons to those parts. Instead, one transported them to Zagreb. I have just been at the Diet in Zagreb when the news came that the enemy intends to attack Koprivnica and Đurđevac, so sir Székely took three pieces, concretely two double Falkonets and one small Falkonet, and ordered their transport to Đurđevac and Koprivnica. If Your Majesty so whishes one more Falkon and one Falkonet could be sent to me. I am humbly waiting for the merciful decision.[37]

Simoniti presented some data on the transport of artillery by horse-drawn carriages: *Kartaune* had to be pulled by 16 horses, *Singerin* by 12, *Notschlange* by 8 to 12 horses, *Falkon* by 4 to 6 and *Falkonet* by 2 to 3 horses. It was a huge and expensive effort. Rivers were used as much as possible. For the transport of artillery during the Croatian expedition against the Ottomans in 1578 one had to summon 378 horses and 73 carriages in Carniola.[38] To transport two *Singerin*

[34] Kruhek, 1995, 88.

[35] On arms and ammunition in the 16th century Bihać and surrounding: Damir Stanić. *Bihać kao sjedište Bihaćke kapetanije i slobodni kraljevski grad (Bihać as Seat of Bihać Captaincy and Free Royal City)*. PhD dissertation, Faculty of Humanities and Social Sciences, University of Zagreb, 2019, 237-251.

[36] Lukas Zäckel (Zaggl, Zekel, Szekely) of Ormož, chief commander of the Croatian-Slavonian Border (1546-1552).

[37] KA, AFA, 1552-11-2

[38] Simoniti, 1991, 196, 221. On transport problems see also: Štefanec, 2011, 294-300, 308, 432-451 et passim.

and respective ammunition and necessities from Varaždin to southern Croatia it required 33 cariages and 276 horses (usually 6 per each carriage), as can be seen from the transcript provided in appendix 6. Reports as cited above are archetypal regarding the transport and distribution of arms and ammunition on the border. As a result, border arsenals were poorly equipped, the ammunition and powder were missing and weaponry was often timeworn and broken.

2. ARMS AND AMMUNITION ON CROATIAN AND SLAVONIAN BORDER IN THE 1577 REGISTER[39]

Studies on small arms, artillery and ammunition on the Croatian and Slavonian Border are still scarce and inadequate.[40] Hungarian sections of the Military Border are much better researched. Studies of József Kelenik, Gábor Ágoston and Géza Pálffy were both instructive and helpful.[41] Following tables systematize data from the register made in 1577 starting with the state of the arms and ammunition on the Slavonian and Croatian Border in 1577.

[39] Data in this chapter are extracted from the 1577 register: KA, AFA, 1577-13-2, 232v-245v.

[40] Valuable are two studies: Ilijanić, 1962-1963; Miroslav Klemm. "Prilog istraživanju oružja na Slavonskoj granici u 16. i 17. stoljeću." in Godišnjak gradskog muzeja Varaždin 6 (1981), 35-47 (based partly on Ilijanić)

[41] József Kelenik. "Szakállas puskák XVI. századi magyarországi inventáriumokban. A terminológia problémái (Harquebuses in the Arms' Inventories of the Sixteenth Century Hungary. A problem of terminology)." in *Hadtörténelmi Közlemények,* Year 35, No. 3 (1988), 484-520; József Kelenik. "A hadügyi forradalom és hatása Magyarországon a tizenötéves háború időszakában. Tények és megjegyzések a császári-királyi hadsereg valós katonai értékéről (The Military Revolution and its Influence in Hungary During the Fifteen Years War. Facts and Notes on the Real Military Value of the Imperial-Royal Army)." in *Hadtörténelmi Közlemények*, Year 103, No. 3 (1990), 85-95; József Kelenik. "A kézi lőfegyverek jelentősége a hadügyi forradalom kibontakozásában: A császári-királyi hadsereg fegyverzetének jellege Magyarországon a tizenötéves háború éveiben (The Significance of Small Firearms in the Ascendancy of the Military Revolution. Imperial-Royal Army's Armament in Hungary During the Fifteen Years War)." in *Hadtörténelmi Közlemények*, Year 104, No. 3. (Sep. 1991), 80-122; József Kelenik. "A kézi lőfegyverek jelentősége a hadügyi forradalom kibontakozásában. A magyar egységek fegyverzete a tizenötéves háború időszakában (The Significance of Small Firearms in the Ascendancy of the Military Revolution. The Armament of the Hungarian Units During the Fifteen Years War)." in *Hadtörténelmi Közlemények*, Year 104, No. 4 (Dec. 1991), 1-50; József Kelenik. "The Military Revolution in Hungary." in Géza Dávid – Pál Fodor (eds.). *Ottomans, Hungarians, and Habsburgs in Central Europe. The Military Confines in the Era of Ottoman Conquest*. Leiden – Boston – Köln, 2000, 117-159; Gábor Ágoston. "Az európai hadügyi forradalom és az oszmánok (The European Military Revolution and the Ottomans)." in *Történelmi szemle*, Year 37, No 4 (1995), 465-485; Gábor Ágoston. "Empires and warfare in east-central Europe, 1550–1750: the Ottoman–Habsburg rivalry and military transformation." in Frank Tallett - D. J. B. Trim (eds.). *European Warfare 1350-1750*. Cambridge University Press, 2010, 110-134; Gábor Ágoston. "Firearms and Military Adaptation: The Ottomans and the European Military Revolution, 1450–1800." in *Journal of World History*, Vol. 25, No. 1 (March 2014), 85-124; Caroline Finkel. *The Administration of Warfare: the Ottoman Military Campaigns in Hungary*, 1593-1606. Wien, 1988.

Table 1: Arms and Ammunition on the Slavonian Border in 1577

Arms/Ammunition	Total	Varaždin HQ	Koprivnica HQ	Križevci HQ	Ivanić HQ	Zagreb HQ	Sisak[42]
Kartaune	-	-	-	-	-	-	-
Notschlange	-	-	-	-	-	-	-
Singerin	2	2 (1 poor)	-	-	-	-	-
Falkon	9	5	2 (1 poor)	-	-	2	-
Falkonet	20	5	5	4	2	4	-
Scharffatindl	8	2	3	1	2	-	-
Eisene Camerstuck	-	-	-	-	-	-	-
Eisene Stück (l)	57	4	20	17[43]	5	11	-
Verzerte[44] *Stücklein*	3	-	-	-	-	3	-
Eisene Mörser	-	-	-	-	-	-	-
Doppelhaken	488	122	118	96	28 good&poor	124	-
Handrohr	74	-	20	-	17	37	-
Spieß	988	760	28	-	-	200 (long)	-
Pulfer in Nürn. c/pf	229 c	114 c	50 c	15 c	10 c	40 c	-
Bley in Nürn. c/pf	13 c 11 pf	-	12 c	-	-	1 c 11 pf	-

Table 2: Arms and Ammunition on the Croatian Border in 1577

Arms/Ammunition	Total	Hrastovica	Bihać	Senj	Ogulin
Kartaune	-	-	-	-	-
Notschlange	-	-	-	-	-
Singerin	-	-	-	-	-
Falkon	4	-	1	3	-
Falkonet	13	-	7	4	2
Scharffatindl	3	-	3	-	-
Eisene Camerstück	2	2	-	-	-
Eisene Stückl(ein)	2	2	-	-	-
Verzerte Stücklein	6	-	-	6	-
Eisene Mörser[45]	17	4	6	2	5
Doppelhaken	367	85 mostly broken	152 mostly broken	99 all broken	31 good & poor
Handrohr	26	16	-	-	10
Spieß	-	-	-	-	-
Pulfer in Nürn. c/pf	115 c	35 c	40 c	30 c	10 c
Bley in Nürn. c/pf	-	-	-	-	-

[42] The source states that Sisak is situated at the place where river Sava enters into Kupa. If enemy conquers Sisak, the entire Croatia and Slavonia will be lost. The emperor does not keep his own weaponry in Sisak because Sisak is maintained by the Chapter of Zagreb. The Chapter should be ordered to provide Sisak with weaponry (*Geschüz*) but since there are only some double and simple *Falkonets* and *Doplhaggen* there it would not be unreasonable to help them with some of the weaponry ordered for the Croatian and Slavonian Border. KA, AFA, 1577-13-2, 236r-236v.

[43] *Eisen vnnd Camerstuck*

[44] Distorted, deformed.

[45] For firing signal shots (*Kreudschüssen*).

Arms, small firearms and artillery mentioned in the 1577 register are known in specialized literature.[46] However, there are still ambiguities in terms of terminology, weight, price and calibre of weapons/ammunition.

The register lists *Hakenbüchse* or hook-guns[47] on both sections of the border and proposes the acquisition of a number of guns termed *Handrohr*. Regarding the first, the register lists a type of *Hakenbüchse* called *Doppelhaken*. *Doppelhake* is one variation of the hook-gun often used in the 16th century.[48] At the Imperial Assembly in Speyer in 1570, it was determined that each 400-men infantry unit (*Fähnlein, zastava, zászlóban*) should be equipped with certain amount of *Doppelhaken* (in 1573 Fronsperger mentions 10 to each *Fähnlein*). In an extensive study of Hungarian material Kelenik concluded that most of military border inventories written in German, including the one form 1577, consistently mention *Doppelhaken* as generic term for *Hakenbüchse* or *Haken*, irrespectively of the weapon's structure, calibre or shape.[49] Addressing inventories in Latin that mention this type of weapon (*Barbatae dupplae*) Kelenik pointed out that there are only some that distinguish the *Doppelhaken* according to their size and weight (*Barbatae maiores sive double, 1564.*). In sum, following Kelenik, we can safely consider *Doppelhaken* as proper hook-guns that sometimes, but not always, used heavier bullets and were a bit heavier than ordinary *Hakenbüchsen*.[50]

A hook-gun on the border was mainly used to defend castles and fortresses and it was the most widespread among smaller firearms on the border. It could be manned by a single soldier. In the 16th and 17th centuries it fired lead balls 20-25 mm in diameter, although it could use lighter stone and iron bullets. The bullets weighed around 4 lots (58g): 8 bullets (*Kugel*) were made from one pound of lead. In cases of proper *Doppelhaken* the bullets could weigh 8 lots (116g). The length of the hook-gun was 1.2 - 2 meters and its weight ranged from 7 to 14 kg. The hook served to stabilize the gun. The hook-gun was superior to other small arms due to its long range of up to 400-500 meters. It could successfully thwart sieges because combat activities took place in much lesser distances to the wall. In addition, the hook-gun could be easily relocated and it could be used from a trench or behind a porthole. One should only be aware of its kicking force.[51]

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46 See for example Klemm, 1981, 35-47.

47 Haken, harquebus, bradatica, szakállas puska, arquebus, arquebuse, archibugio, arcabuz, harkbus, hagbut, etc.

48 Known are also *Halbhaken*, lighter infantry weapon different to heavier *Hakenbüchsen* or *Doppelhaken*.

49 Kelenik, 1988, 486, 489, 498 et passim.

50 Kelenik, 1988, 498; Georg Ortenburg. *Waffen der Landsknechte, 1500-1650*. Bechtermünz. 2002 (1984), 55.

51 Ortenburg, 2002, 54-55; Kelenik, 2000, 124-125; Simoniti, 1991, 196.

The 1577 register also lists two types of handgonne or hand-guns (*Handrohr*). Some simpler examples of this weapon, still used in the 16th century, could be classified as precursors to matchlocks (*Luntenschloss*, *fitiljača*) or muskets because they required direct manual external ignition without an elaborate firing mechanism. However, one type of *Handrohr* listed in the register was furnished with the *Schwammschloss* and the other with the *Feuerschloss*. Both featured standardly attached powder flasks (*sambt gutten pulfer flaschen*). *Schwamschloß* was related to standard matchlock (*Luntenschloss*) where the ignition was provided by a slow match (match cord, twine fuse, *die Lunte*). Only, instead of a burning slow match one put a piece of burning 'sponge' (*Feuerschwamm*) on top of the swan neck hammer (cock) or in a small tube/cylinder on top of a cock. Often, a Tinder Conk (*Fomes fomentarius, Poliporus Igniarius*), also known as Hoof Fungus, was used to make punk which ignited the gunpowder. This mechanism was still used in the 17th century.[52]

As for the *Feuerschloss*, an expert in Styrian 16th century weaponry explains that *Feuerschloss* was *Radschloss*. The ignition was provided by iron pyrite inserted into the cock (*in den Lippen des Hahnes befestigten Schwefelkies Funken, die das Zündkraut auf der Pfanne entflammten*).[53] It was the friction-wheel mechanism where the rotation of spring-loaded steel wheel against a piece of pyrite generated spark and ignited the gunpowder placed in a pan. The wheel-lock (*Radschloss*), which preceded the flintlock, was an advanced phase in the development of small firearms in comparison to matchlock. The prices of *Schwammschloss Handrohr* (3 f) and *Feuerschloss Handrohr* (4 f 30 kr) also suggest that the latter was more technically advanced. Therefore, we could conclude that one batch of handgonne

[52] "Schwammschloss war dem Luntenschloss ähnlich. Statt der Lunte wurde am Ende des schwanenhalsförmigen Hahnes ein Stück Feuerschwamm eingesetzt, der nach dem Anzünden weiterglimmte. Bei Betätigung des Abzuges fiel der Hahn auf das Pfannenpulver und brachte es zur Entzündung." Josef Ofner. "Die Gesellschaft der Rohr- und Büchsenhandlung in Steyr. Ein Beitrag zur Geschichte der Steyrer Waffenindustrie." in *Veröffentlichungen des Kulturamtes der Stadt Steyr*, Heft 22 (Dec. 1961), 30-44, here 40. See also: Erich Haenel. *Alte Wafen. Mit 88 Abbildungen, Zweite Auflage*. Richard Carl Schmidt & Co., Berlin, 1920, 89-93; Peter H. Kunz. *Technische Entwicklung der Feuerwaffen 1200 bis 1900: eine Zusammenfassung der wichtigsten historischen und technischen Daten in Texten, Zeichnungen und Bildern*. Zürich, 2008, 194; Ortenburg, 2002, 57-59.

[53] Ofner, 1961, 38-40. "Feuer-Schloß, ist dasjenige Stück an einer Buchse, Flinte, Pistole und anderen dergleichen Hand-Gewehr, wodurch das Feuer angeschlagen, und sie also gelöset werden. Es bestehet aus vielen Theilen, davon die vornehmsten sind, der Hahn, welcher der Feuer-Stein fasset, die Pfanne, worinne das Pulver ist. Beyde können durch die innwendige Feder und Nuß ausgespannet, und durch den Abzug oder Schneller wieder abgelassen werden. Solche Feuer-Schlösser sollen vor ungefehr zweyhundert Jahren zu Augspurg zu erst erfunden seyn, und sind nachgehends auf sehr verschiedene Arten gemachet und verbessert worden." Johann Heinrich Zedler. *Grosses vollständiges Universal-Lexicon aller Wissenschafften und Künste*. Bd 9 (F), Halle-Leipzig, 1731-1754, 767 (https://www.zedler-lexikon.de/index.html?c=startseite&l=de); Ortenburg, 2002, 60-61.

requested for the Croatian and Slavonian Border was furnished by older type of mechanism where the ignition was provided by a slow match, maybe even literally a type of traditionally used fungi or mushroom (*Schwamm*, *guba*), while the other batch of handgonne was furnished by wheel-lock.

In general, *Handrohr* was a type of hand-gun intended for open fight and field-battles. It could pierce an armour. Its reach was around 150 meters. It weighed around 6,1 kg (12 pounds or pfund[54]) and it fired 2 lot lead bullets (29g): 16-18 bullets were made from one pound of lead.[55]

The 1577 register mentions a number of artillery pieces: *Quartaune, Notschlange, Singerin, Falcon, Falconet, Scharffatindl, Eisene Camerstück, Eisene Stückl(ein), Eisenen Mörser*. Size and weight of mentioned artillery and ammunition does not completely relate to the 16th century models described in early modern lexicons and specialized studies that I present for comparison. This is not surprising because the weaponry was not nearly standardized in the 16th century.[56] For example, Ortenburg systematized information from two basic military manuals from the mid 16th century, those of Leonhard Fronsperger and Reinhard von Solms. Even they differed regarding the choice of artillery pieces and weight of iron/lead cannonballs.[57]

These differences should not bother us too much, because exactly the primary military sources like the 1577 register could help us to refine our knowledge and bring forward precise contemporary data on weight and prices of arms and

[54] 1 Nürnberger Centner (50,95 kg) = 100 pounds (Pfund, pf). 1 Nürnberger Pfund (509,5 g) =32 lots (Loth, lth)

[55] Ortenburg, 2002, 52-56.

[56] Important military lexicon provides Italian and German taxonomy of early modern artillery: "Die deutschen Büchsenmeister dagegen theilten die Kanonen in Mauerbrecher, wozu man das ganze Belagerungsgeschütz rechnete, und in Feldgeschütze. Erstere bestanden aus folgenden Arten: die **Scharpfe Meße** schoß 100 pf Eisen; die **Kanone** (**Basilisk**, **Notbüchse**) schoß 75 pf Eisen; die **Singerin** (von welcher sich die **Nachtigall** nur durch die größere Länge unterschied) schoß 50 pf Eisen; die **Quartana** (**Karthaune**, **Viertelsbüchse**) schoß 25 pf Eisen. Zu den Feldgeschützen gehörte dagegen: die **Notschlange** (**Drache**) schoß 16 bis 18 pf Eisen; die **Schlange** schoß 8 pf Eisen; die **Falkone** (**Falkhorn**, **halbe Schlange**) schoß 4 bis 5 pf Eisen; das **Falkonet** schoß gewöhnlich 2 pf Eisen oder Blei. Hierzu kam noch etwas später das **scharfe Tindlein** (Scharpentin, Serpentinlein), welches nur 16 Lth Blei schoß. Damals rechnete man durchgängig bei den Geschützröhren auf jedes Pfund der Kugel 2 bis 2 ¼ Centner Metall, und bei den Geschützen, welche über 50 Centner wogen, auf 2 Centner, bei den leichten auf 3 Centner des Rohrgewichtes 1 Pferd zum Transport. ... **Igel**- oder **Orgelgeschütze** bestanden damals aus einer bedeutenden Anzahl eiserner Röhre, welche 8 bis 16 Centner Blei schossen," *Militair-Conversations-Lexicon bearbeitet von mehreren deutschen Officieren redigirt und herausgegeben von Hanns Eggert Willibald von der Lühe, Königl. Sächs. Officier*. Vol. 3 (F,G und H). Wigand Verlag. Leipzig, 1834, 391-392.

[57] "**L. Fronsperger**: Scharfe Metze 100 pf, Basilisk 70 pf, Nachtigall 50 pf, Singerin, 20 pf, Große Quartanschlange 16 pf, Notschlange 15 pf, Quartanschlange 10 pf, halbe Notschlange 7 pf, Falkaune/Falkana 5 pf, Falkonett 2 pf, Scharfentinlein ½ pf Blei; **R. von Solms**: Scharfe Metze 85 pf, Nachtigall 70 pf, Kartaune 45 pf, Halbkartaune 25 pf, Notschlange 16 pf, Feldschlange 12 pf, Halbschlange 7 pf, Viertelschlange 2 pf." Data from Ortenburg, 2002, 74.

ammunition used in one European theatre of war. The register from 1577 offers valuable information. Following tables systematize types of new weapon requested for fortresses on the Slavonian and Croatian Border.

Table 3: Proposed Improvements of the Arsenal on the Slavonian Border (1577)

Artillery/Small Arms	Total	Varaždin HQ	Koprivnica	Križevci	Ivanić	Zagreb HQ	Sisak
Kartaune	2	2	-	-	-	-	-
Notschlange	10	2	2	2	2	2	-
Singerin	2	2	-	-	-	-	-
Falkon	22	5	8	3	3	3	-
Falkonet	32	10	-	10	8	4	-
Scharffatindl	-	-	-	-	-	-	-
Eisene Stückl	-	-	-	-	-	-	-
Eisene Mörser	10	-	-	-	-	-	-
Doppelhaken	1500	300	300	300	300	300	-

Table 4: Proposed Improvements of the Arsenal on the Croatian Border (1577)

Artillery/Small Arms	Total	Hrastovica	Bihać	Senj	Ogulin
Kartaune	-	-	-	-	-
Notschlange	5	-	2	3	-
Singerin	-	-	-	-	-
Falkon	16	5	4	5	2
Falkonet	43	-	23	16	4
Scharffatindl	-	-	-	-	-
Eisene Stückl	-	-	-	-	-
Eisene Mörser	38	10	20	8	-
Dopplhaken	1000	250	250	250	250

Kartaune (*Quartaune*), Kartouwe or *Viertelbüchse* was the largest piece of artillery. It was only requested for the better equipped Slavonian Border. Kurrelmeyer, based on the texts from the 16th century, which are highly relevant for this paper, says: "German Lexicographers are practically unanimous in deriving *Kartaune*, together with its variant *Kartauwe*, from an Italian word *quartana*, interpreted to mean either 'a gun of the fourth magnitude' or one 'which fires a ball of 25 pounds.'"[58] Data from Kurrelmeyer do not match with our register. Data from Ortenburg do not match either. According to them Kartaune used cannonballs weighing from 42

[58] W. Kurrelmeyer. "Kartaune, Kartauwe." in *PMLA* 35/1 (1920), 63–75, here 63-64 (www.jstor.org/stable/457239). "Kartaune *f.* Ital. *cortana* 'kurze Kanone' (zu ital. *corto*, unserm kurz) gelangt um 1475 als Curtan in die Schweiz, 1489 als Kartune nach Oberdeutschland; nnl. ist *kartouw*. Scheidung von dem seither untergegangenen Quartana 'Viertelsbüchse (die Kugeln zu 25 Pfund schießt)' ist nicht immer möglich." Friedrich Kluge. *Etymologisches Wörterbuch der deutschen Sprache*, Berlin, 1957[17], 354; Ortenburg, 2002, 67-69, 72.

to 48 pounds.[59] However, in the exact words of the 1577 register the two requested *Quartaune* fired iron cannonballs of 40 pounds (pf).

With regard to *Notschlange* or *Schlange*, contemporaries knew several types of *Schlangen*: *Basilisk*, *lange Schlange*, *Notschlange*, *Mittelschlange* and *Falconet*. *Schlangen* had long barrels (20-40 calibre[60]), firing relatively small iron cannonballs.[61] *Notschlange* apparently fired 16 to 18 pf iron projectiles (see footnotes 56-57 for example). In the case of 1577 register, terms *Notschlange* and *Schlange* interchange. *(Not)schlange* weighed 45 c, costed 1000 f and used iron cannonballs of 15 pf, which corresponds to Fronsperger's data cited by Ortenburg.

Singerin is part of the family of canons but there appear large ambiguities.[62] Based on the data from the 1577 register it could be calculated that two *Singerin* from the Slavonian Border fired iron cannonballs that weighed 250 pounds or 2,5 centner (127,4 kg) each, which is much heavier than stated in literature. The handwriting in the register is clear: *Zu den 2 Singerin 600 kugl die wegen 1500 Centner, thuet 3750 f)*. This information seems correct because the numbers add up, but one still has to leave a possibility of misspelling on behalf of the secretary.

Falkon was a regular piece of artillery on the border. The 1577 register mentions that one piece weighs 25 c and costs 600 f. It consistently states that *Falkon* fires 6 pf iron cannonballs.

Term *Falkonet* appears often in the 1577 register and *Doplfalconet* only once. The register states that *Falkonet* weighs 10 c, costs 250 f and fires 2 pf iron cannonballs

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59 Ortenburg, 2002, 74.

60 In 1540, Georg Hartman invented the calibre gauge to determine the weights of cannonballs (*Kaliberstab nach Nürnberger Maas*) from the muzzle sizes of cannon. He also invented gunner's sights and levels. See also: Franz Karl Schleicher. *Handbuch der Artillerie: Erster Theil. Mit Kupfern*. Marburg, 1799, 103 et passim.

61 Ortneburg, 2002, 69, 75. "(Feld-)Schlange, Coulevrine, ist ein Geschüß, welches eben also gebrauchet wird, wie die Stücke. Nur darinnen ist ein Unterschied, daß sie länger ist, und folglich auch weiter schieset. Man pfleget sie in Festungen auff einen Cavalier zu setzen. Der Diameter einer ganzen Feld-Schlange hat 4 Daumen und 12 Linien, schiesset ungefehr eine 16 biß 18 pfundige Kugel, wieget nach dem Nürnberger Gewicht 45 biß 50 Centner, und treibet ihr Kern-Schuß etwan 600 gemeine Schritte weit. Eine halbe Feld-Schlange schiesset eine Kugel von 9 biß 10 Pfund Eisen, wieget an metall 30 Centner und drüber, und thut ihr Kern-Schuß etwan 450 Schritte. Die Viertel- oder Quarter- Feld-Schlange, sonsten auch Falcaune genannt, schieset eine Kugel von 5 Pfund Eisen, wieget an Metall ungefehr 25 Centner, und ist ihr Kern-Schuß etwan 350 Schritte." *Reales Staats- und Zeitungs-Lexicon*, foreword by Johann Hübner. Gleditsch Verlag. Leipzig, 1706[2], 543.

62 According to some studies "Singerin is Halbe Kartaune": Manfried Rauchensteiner - Manfred Litscher, eds. *Das Heeresgeschichtliche Museum in Wien*. Styria Verlag. Graz-Wien, 2000, 95. In some studies *Singerin* is *tripplicana*: "... kana (it. *canna*), die wir nennen basilisken, die schiessen 75 pfund eisen; dupplicana oder nachtigal, tripplicana oder singerin, quartana (*kartaune*) u. s. w.; bis auf letztere sind sie also ital. alle von canna benannt und erhielten nachher den gesamtnamen cannone, canon, engl. cannon, span. cañon, port. canhaõ, nnl. dän. schwed. kanon." *Deutsches Wörterbuch von Jacob und Wilhelm Grimm, 16 Bde. in 32 Teilbänden*. Leipzig, 1971, 1854-1961 (Online-Version: 06.11.2019).

(*Falconet ... aine 10 Cent. wigt vnnd 2 pf Eisen scheusst Cost ains 250 f*[63]). These data concur with available manuals.[64] The 1577 register also states that *Doplfalconet* weighs 10 c, costs 250 f and uses 2 pf iron cannonballs.[65] It could be due to a mistake from the secretary that introduces the word *Doplfalconet* only once in the register.

Scharffatindl or *Scharfentinlein* was amongst the lightest artillery pieces, almost similar to *Doppelhaken*. Ofner, Ortenburg (Fronsperger) and *Militair-Conversations-Lexicon* agree on the fact that *Scharfentinlein* fired lead balls 0,5 pf. However, data from the 1577 register testify to the fact that *Scharffatindl* on the border fired *Vierdings*, balls weighing 0,25 pf or 8 lot.[66]

There is also a category of *Eisene stuckl* or *Eisene Stücklein* (setting aside pieces registered as *Verzerte stücklein* or deformed pieces). In the inventory of the Slavonian border from December 1578 (see appendix 5) *Eisene Stückl(ein)* mostly appear on wheeled carriages. They used iron cannonballs or bullets of 2 pf, similarly to *falkonet*. Great quantities of these bullets were requested in 1577. *Kammerstück* was usually a weapon with special chamber (*Camer, Kammer*) in the rear part of the barrel which could be replaced. One could prepare more chambers in advance and accelerate the gunfire.[67] *Kammerstück* is not mentioned in the lists of requested weapons. It is rather rare in the 1577 register of existing weapons, but there are numerous pieces called *kleine Camerstück* or *klein khamer stykhl* in the inventory of the Slavonian border from December 1578. They were dominantly used for signalling purposes.[68]

Igelgeschütz or *Orgelgeschütz* (see footnote 56) was not declared in 1577, but there were four pieces of *Argl* with 16 barrels each in Križevci (*Item ist verhanden für Argl, Mit sehssehen Rör Alle für, Idest 4 Argl*) and some pieces with three barrels on the Slavonian Border in December of 1578 (see appendix 5). Finally, there were iron mortars (*Eisene Mörser*). European mortars used stone balls, both for firing and

63 KA, AFA, 1577-13-2, 242v, similar 237r.

64 "Falconet is eine Art Stücke Geschüßes 6 bis 7 Fuß lang, welches 2 Daumen im Diameter hat, und dessen Kugel 2 Pfund wieget. Man brauchet sie insgemein im Felde, weil sie leichtlich fortzubringen seynd. Ein Falconet wieget an Metall 10 bis 12 Centner, und ist sein Kern-Schuß etwan 280 Schritte. Ein halbes Falconet schiesset eine Kugel von 1 Pfund Eisen, wieget an Metall 6 biß 7 Centner, und ist sein Kern-Schuß etwan 206 Schritte." Hübner, 1706², 536.

65 *Doplfalconet ... ains 10 Cent. wigt ... 2 pf Eisen scheusst ... ains ... auf 250 f*. KA, AFA, 1577-13-2, 242v.

66 "Scharfentiendl (Scharfentintlein, Scharfentinle). Ein leichtes Geschütz im Gewicht von ein bis einenhalb Zentner,) die Bleigeschoße wogen ½ Pfund und (25 bis 28 dkg). Die Preis richtete sich nach der Größe, doch konnten sie in Steyr unter 13 f 2 ß nicht hergestellt werden." Ofner, 1961, 38. See also Ortenburg, 2002, 74.

67 Moritz Meyer. *Handbuch der Geschichte der Feuerwaffen-Technik*. Berlin, 1835, 33; Ortenburg, 2002, 65-66.

68 See numerous references in the appendix 5: KA, AFA, 1578-12-4.

throwing. Calibres were not standardized for a long time.[69] Mortars on the border were mainly used for signalling (they usually used gunpowder, not projectiles).

The gunpowder (*Puluer*, *Pulfer*) in the 1577 register is not divided into sorts, although border inventories usually distinguish two sorts, often referring to granulation: *Kernpulfer* for small weapons and *Zeugpulfer* for the artillery. The division is clearly visible in the inventories of the Slavonian armourer Dominico Conduto provided in the appendix to this paper.[70] The gunpowder in the 1577 register mostly costs 12 f per centner. The exception is the gunpowder intended for *Singerin*, *Eisene Mörser* and *Eisene stücklein*, which could be due to misspelling. The secretary could mistakenly write 8000 f instead of 9000 f, 5 c instead of 6 c and 140 f instead of 240 f. These would be rather small mistakes considering the number of items in the register.

Following two tables are also based on the data from the 1577 register. They bring further information on the artillery used on the Croatian and Slavonian border: type, number and weight of urgently ordered weapons in Nürnberger Centners and Pounds[71]; number, weight and price of requested projectiles (*Kugel*, *Kugl* = cannonball) for old and new weaponry, amount and price of requested powder and lead, etc. These data enable us to define the weaponry in more detail.

[69] On *Steinmörser*: Johann Gottfried von Hoyer. *Allgemeines Wörterbuch der Artillerie: welches die Erklärung aller verschiedenen Kunstwörter, Begriffe und Lehrsätze der Geschüzkunst in theoretischer und praktischer Hinsicht, nebst der Geschichte der wichtigsten Erfindungen in derselben, enthält*. Cotta. Tübingen, 1804, 200-201 et passim. See also: Ortenburg, 2002, 68, 71, 74.

[70] Excellent study on gunpowder and artillery used on the Military Border in the 16th century in: Béla Iványi. "A tüzérség története Magyarországon kezdetétől 1711-ig. (The history of artillery in Hungary from the beginning to 1711)." in *Hadtörténelmi Közlemények*, Year 29, No 1 (1928), 152-176.

[71] 1 Nürnberger Centner (50,95 kg) = 100 pounds (Pfund, pf). 1 Nürnberger Pfund (509,5 g) = 32 lots (Loth, lth).

Table 5: Powder and Ammunition Urgently Requested for New and Old Weapons on the Slavonian Border in 1577 (NB: urgent requests are lower than proposals)[72]

FOR NEW WEAPONS									
Weapon type	Kartaune	Schlange	Falkon	Falkonet	Doppel-haken	Eisene Mörser	Handrohr Schwamm.[73]	Handrohr Feuer.[74]	Feuer-werk
Number of requested weapons	2	6	6	20	1000	10	250	250	-
Price of 1 weapon in rhen. guilders (f)	1500 f	1000f	600 f	250 f	4 f	15 f	3 f	4 f 30 kr	-
Price of all weapons	3000 f	6000 f	3600 f	5000 f	4000 f	150 f	750 f	1125 f	-
Weight of 1 weapon in Nür. centner	60 c	-	-	10 c	-	-	-	-	-
Weight of 1 iron projectile in pounds	40 pf	15 pf	6 pf	2 pf	-	-	-	-	-
Requested projectiles per 1 weapon	150	300	300	300	25 pf	-	-	-	-
Total number of requested projectiles	300	1800	1800	6000	-	-	-	-	-
Total weight of all requested projectiles	120 c	270 c	108 c	120 c[75]	250 c	-	-	-	-
Price of 1 centner of projectiles	2 f 30 kr	2 f 30 kr	5 f	5 f	5 f	-	-	-	-
Total price of requested projectiles	300 f	675 f	540 f	600 f	1250 f	-	-	-	-
Powder in centners	60 c	135 c[76]	54 c	60 c	125 c	5 c	50 c		50 c
Price of one centner of powder	12 f	12 f	12 f	-	12 f	-	12 f		12 f
Total price of powder	720 f	1620 f	648 f	700 f	1500 f	72 f	600 f		600 f
Lead (*Pley*)	-	-	-	-	-	-	100 c for 400 f		-

FOR OLD WEAPONS					
Weapon type	Singerin	Falkon	Falkonet	Eisene Stücklein	Doppelhaken
Existing weapons	2	9 or 15[77]	20	57	488
Weight of 1 iron projectile in pounds	2,5 c	6 pf	2 pf	2 pf	-

[72] KA, AFA, 1577-13-2, 232v-245v. Numbers are from the source. Calculations made by N. Štefanec are underlined.

[73] *Handtrör 250 mit Iren schwammen schlössern, sambt Iren gutten Pulfer flaschen.*

[74] *Handtrör mit Feurschlössen 250.*

[75] The secretary wrote 240 c (*Falconet 20 deren aine 10 Cent. wigt vnnd 2 pf Eisen Schusst Cost ains 250 f thuet 5000 f. Kugln darzue 6000 wegen 240 Cent. thuet 600 f.* KA, AFA, 1577-13-2, 237r) but it is clearly a mistake. It should have been written 120 c as in the page 243v because numbers than add up consistently (*Zu den Falconeten vnnd verIrrten stücken deren 20 sein, Scheust ains in das And(ere) bei 2 pf Eisen, 6000 kugln die wegen 120 Cent. thuet 600 f.* KA, AFA, 1577-13-2, 243v).

[76] The written amount (435 Cent, 236r) is probably misspelled, because the total amount of guilders ads up.

[77] It was stated that one should order 300 pieces of projectiles per one weapon. However, the secretary, maybe mistakenly, pens: *Zu den 9 Falconen 4500 kugln die wegen 270 Centen thuet 1350 f.*

Table 5 (continued)

Requested projectiles per 1 weapon	300	-	300	-	25 pf
Total number of requested projectiles	600	4500	6000	2000	-
Total weight of all requested projectiles	1500 c	270 c	120 c	40 c	122 c
Price of 1 centner of projectiles	2,5 f	5 f	5 f	20 f	5 f
Total price of requested projectiles	3750 f	1350 f	600 f	800 f	610 f
Powder in centners	750 c	135 c	60 c	20 c	15 c
Price of one centner of powder	-	12 f	12 f	7 f	12 f
Total price of powder	8000 f	1620 f	720 f	140 f	180 f

According to the 1577 register, in addition to requested supplies of powder and ammunition, the Slavonian Border should have been urgently furnished with the ingredients for the concoction of black powder[78]: 50 c of saltpetre for 500 f, 25 c of sulphur for 100 f and 25 c of pitch (*Poch/Pöch*[79]) for 75 f. Furthermore, 2000 long pikes for 508 f 20 kr were requested as well as 250 halberds for 250 f, 500 *darda* for 250 f, 250 blades/swords (*Seitenweer*) for 375 f, 250 belts (*Gürtl*) for 125 f, ropes or fuses (*Sailwerch*) for 1500 f, 500 protective hats / helmets (*Schüzenhüet*) for 750 f, 500 armours (*Harnisch*) for 4000 f, iron nails and similar for 1000 f.[80]

[78] Traditional black powder is a mixture of saltpetre (potassium nitrate, KNO3, 75%), charcoal (C, 15%) and sulphur (S, 10%). Due to relative stability it has to be ignited by heat or flame. It produces a lot of smoke. Charcoal powder is sometimes listed as *kholl* in registers made by the Military Border armourers (*Feuerwerch. Schwebl Cennten10, kholl Cennten 1, Pöch Cennten 5, dartzue auch Allerley Pindstrickh vnnd Pindtschmer*. KA, AFA, 1578-10-7, 2r). Charcoal powder could be purchased or produced by burning the trees and grinding the charcoal to powder.

[79] *Poch* also signifies a traditional machine for the shredding of ore which was installed in smelteries or ironworks. Here, *Pöch* is probably pitch or resin, which was also used (with petroleum/ *naphtha*, sulphur, maybe saltpetre etc.) for the production of Greek fire, a precursor to black powder, in the 7th century Eastern Roman (Byzantine) Empire.

[80] KA, AFA, 1577-13-2, 232v-245v.

Table 6: Powder and Ammunition Urgently Requested for New and Old Weapons on the Croatian Border in 1577 (NB: urgent requests are similar to proposals)[81]

FOR NEW WEAPONS								
Weapon type	Schlange	Falkon	Doppel-falkonet	Doppel-haken	Eisene Mörser	Handrohr Schwamm.[82]	Handrohr Feuer.[83]	Feuer-werk
Number of requested weapons	5	16	20	1000	38	500	500	-
Price of 1 weapon in rhen. g. (f)	1000 f	600 f	250 f	4 f	15 f	3 f	4 f 30 kr	-
Price of all weapons	5000 f	9600 f	5000 f	4000 f	570 f	1500 f	2250 f	-
Weight of weapon in Nürnb. c.	45 c	25 c	10 c	-	-			-
Weight of 1 iron projectile in pounds	15 pf	6 pf	2 pf	-	-			-
Requested projectiles per 1 weapon	300	300	300	25 pf	-			-
Total number of requested projectiles	1500	4800	6000	-	-			-
Total weight of all requested projectiles	225 c	288 c	120 c	250 c	-			-
Price of 1 centner of projectiles	2 f 30 kr	5 f	5 f	5 f	-			-
Total price of requested projectiles	562 f 30 kr	1440 f	600 f	1250 f	-			-
Powder in centners	112,5 c	144 c	60 c	125 c	50 pf x 38=19 c	50 c		50 c
Price of one centner of powder	12 f	12 f	12 f	12 f	-	12 f		12 f
Total price of powder	1350 f	1728 f	720 f	1500 f	500 f	600 f		600 f
Lead (*Pley*)	-	-	-	-	-	100 c for 400 f		-

FOR OLD WEAPONS				
Weapon type	Falkon	Falkonet & deformed pieces	Scharffatindl	Doppelhaken
Existing weapons	4	20	8	367
Weight of 1 iron projectile	6 pf	2 pf	0,25 pf (*Vierding Eisen*)	-
Requested projectiles per 1 weapon	300	300	300	-
Total number of requested projectiles	1200	6000	2400	-
Total weight of all requested projectiles	72 c	120 c	6 c	91 c
Price of 1 centner of projectiles	-	5 f	12 f	5 f
Total price of requested projectiles	150 f	600 f	72 f	455 f
Powder in centners	31 c	60 c	3c	45 c
Price of one centner of powder	12 f	12 f	12 f	12 f
Total price of powder	372 f	720 f	36 f	540 f

[81] KA, AFA, 1577-13-2, 232v-245v. Numbers are from the source. Calculations made by N. Štefanec are underlined.

[82] *Hanndtrör mit schwammen schlössern 500 sambt seinen gutten pulfer flaschen*. KA, AFA, 1577-13-2, 243r.

[83] *Handror mit Feurschlössen sampt iren gutten flaschen 500*. KA, AFA, 1577-13-2, 243r.

Furthermore, for the Croatian Border one urgently requested ingredients for the production of black powder as well as a number of other necessities, as follows: 50 c of saltpetre for 500 f, 25 c of sulphur for 100 f and 25 c of pitch (*Poch*) for 75 f, 4000 long pikes for 1016 f 40 kr, 500 halberds for 500 f, 500 *darda* for 250 f, 500 blades/swords (*Seitenweer*) for 750 f, 500 belts for 250 f, ropes or fuse (*Sailwerch*) for 1500 f, 500 protective hats or helmets (*Schüzenhuet*) for 4000 f[84], iron nails and similar necessities for 1000 f. [85]

The authorities concluded that this amount of new arms and ammunition is urgently needed due to utter hardship and instant needs. Once the fortresses were improved and better constructed, one should order more of the same. Councillors in Vienna transferred the financing of these needs to Archduke Charles, who obtained the imperial dotation, and to Inner-Austrian Lands. However, they promised some extra help from the emperor due to dangerous circumstances, especially on the Croatian Border, namely, 1000 c of copper, 100 c of tin (*Zin*) and 500 c of saltpetre, for the casting of new weapons and production of powder.[86]

Table 7: Planned spending on Arms and Ammunition on the Slavonian and Croatian Border in 1577 in rhenish guilders (f)[87]

	Slavonian Border	Croatian Border	Total
Ammunition for existing /old weapons	17.770 f	15.236 f 40 kr	33.006 f 40 kr
Newly requested arms, ammunition and necessities	43.283 f 20 kr	37.570 f 30 kr	80.853 f 50 kr
Total	**61.053 f 20 kr**	**52.807 f 10 kr**	**113.860 f 30 kr**

The artillery pieces were hugely expensive with regard to the fact that ordinary footman was paid 3 f per month and cavalryman around 5-8 f per month – if paid at all. According to the 1577 register one Kartaune costed 1500 f, *Schlange* 1000 f, *Falkon* 600 f, *Falkonet* 250 f, *Doppelhaken* 4 f, and *Handrohr* between 3 f and 4 f 30 kr, depending on the firing mechanism. In fact, prices rapidly grew. According to one register of arms, ammunition and equipment made by Inner-Austrian lands in the mid 1580s, Kartaune costed 3450 f, *Singerin* 1593 f, *Notschlange* 1775 f, *Falkon* 980 f, *Falkonet* 388 f, mortar 475 f, *Doppelhaken* 10 f and *Handrohr* around 3 f.[88]

However, the first step was made. One knew exactly the state of arms and ammunition on the Military Border and what would it cost to improve it in order to match the Ottoman potential. This amount of planned investment into the

[84] The secretary probably wanted to write 500 protective hats for 750 f and 500 armours for 4000 f as in the case of Slavonian Border.

[85] KA, AFA, 1577-13-2, 232v-245v.

[86] KA, AFA, 1577-13-2, 245r-245v.

[87] KA, AFA, 1577-13-2, 232v-245v.

[88] Simoniti, 1991, 196; Simoniti, 1988, 165-166.

military border armament and ammunition was unprecedented in the history of the Military Border. Of course, the border garrisons were eventually not equipped as desired in 1577, but Military Border arsenals eventually improved as well as the entire system of maintenance of arms and armament.

3. CONCLUSIONS

Several conclusions could be drawn using the presented material and available studies. Although the weaponry on the Croatian and Slavonian border was generally highly insufficient and often in dismal state prior to reforms in 1577/78, the Slavonian Border was still better equipped with small firearms and artillery than the Croatian Border. Also, there was more powder and ammunition in Slavonia and firearms were in somewhat better condition. It was partly due to lesser extent of military operations in Slavonia and greatly due to the office of the Slavonian armourer (Bartlmee Weiss, Dominico Conduto) appointed by the Styrians to take care of the arms from the 1550s, while similar care on the Croatian border lacked until the late 1570s.

The 1577 register lists all arms and armament stored on the Croatian and Slavonian Border in summer 1577. However, in absence of previous such lists, we may ask ourselves how old, approximately, were the assets listed in 1577. Some other documents can provide part of response. Dominico Conduto, armourer of the Slavonian Border, made a list of items that entered Varaždin arsenal from 1568 until 1578.[89] This list, available in the appendix 3 to this paper, illustrates that Slavonian arsenal was only sporadically supplied from 1568, mostly with powder and lead and only exceptionally with new pieces of artillery. It clearly shows that the majority of weapons stored on the Slavonian Border in 1577 were at least 10 or more years old.

Moreover, Conduto's detailed register of Slavonian armoury from 1578, presented in the appendix 5 of this paper, often mentions foul and rotten wheels, decayed wooden parts and inoperative weapons.[90] State of the artillery on the Croatian border in 1577 was even worse, especially the state of the *Doppelhaken* which was abysmal, as visible from the tables above (85 mostly broken in Hrastovica, 152 mostly broken in Bihać, 99 all broken in Senj and 31 good and poor in Ogulin). In general, weaponry was rusted, of poor quality, overused, perforated and prone to shatter. Often, it was due to its improper usage. For example, weaponry was used to celebrate Christenings and other festive occasions. In the absence of mortars, *Doppelhaken* were used for frequent signalling, even *Falkons*. Small *Camerstück* pieces often served this purpose too.[91] From similar documents and innumerable grievances written by

[89] KA, AFA, 1578-10-ad1-b. On Conduto's registers see also Ilijanić, 1962-1963, 35-36 et passim.

[90] KA, AFA, 1578-12-4

[91] Štefanec, 2011, 210; Simoniti, 1991, 196. Numerous references in the appendix 5: KA, AFA, 1578-12-4.

border commanders, we can rather safely assume that large parts of Slavonian and Croatian weaponry in 1577 was old several decades or even more.

Arsenals in Ljubljana (responsible mainly for the Croatian border) and Graz (responsible mainly for the Slavonian border and later Karlovac) were well equipped. However, every attempt to distribute the arms and ammunition to the border ran into many obstacles due to absence of roads, insecurity and high costs of transport. One could see that by the end of the 1570s it was fully recognized by the military authorities in Vienna and Graz how important the organization of the network of arsenals, armouries, storages and trained personnel was. Entire sections of two large military assemblies were devoted to discussions on arms and armament. Major sums were channelled into improvement of quality and quantity of firearms on the border, and clear hierarchy was developed in the office of Chief Arsenal Treasurer that reached every border fortress in Croatia and Slavonia. It was a step forward, especially in view of the fact that in 1578 numerous fortresses that were previously neglected and inoperative, started to function on regular basis, which required significant money for building purposes.[92] Hence, the improvements were not immediate, but they gave results until the start of the Long War or Fifteen Years War.

Discussions on the strategy of war against the Ottomans from the mid 16th century until the 1570s usually finished with one far-reaching conclusion, which was prompted by Lazarus von Schwendy. Habsburg forces were still not potent enough to lead offensive war against the Ottomans so one should lead defensive war and always strive to maintain peace or restore the truce. All tactical decisions from the 1570s follow this assessment.[93] Long and dense line of fortresses was created from the Adriatic to Transylvania in order to thwart Ottoman attacks. There were no big field battles in the Croatian and Slavonian theatre of war nor training of pike and shot formations. There prevailed short Ottoman sieges of border fortresses, skirmishes and the so called 'small war'. Subsequently, the perfect weapons for such type of warfare were defence weapons such as hook-guns and some pieces of artillery. These were insufficient and often damaged. The solution of highest military councillors was to improve the logistics, to significantly increase the number of selected weapons (hook-guns, chosen pieces of artillery) and to support it with enough powder and ammunition. While there was planned in the near future to order more hook-guns for the Slavonian Border (1500:1000), it was eventually decided that the same amount (1000) will be urgently ordered for each section. The list of small firearms and artillery requested for the Croatian and Slavonian Border illustrates the intent to optimize the functioning of the defensive line against the Ottomans.

92 See maps in: Štefanec, 2011, 495-501.

93 Discussions on strategy and tactics of Habsburg defence against the Ottomans on imperial, regional and local level are elaborated in: Štefanec, 2011, 139-169, 273-322 et passim.

Furthermore, due to frequent skirmishes and hand-to-hand combats one had to improve overall armament of salaried border units, especially through lighter hand-guns, explosives and a significant quantity of cold weapons and other necessities (pikes, halberds, blades/swords, armours, helmets). The Croatian Border was planned to be equipped with twice as pieces of cold weapons than the Croatian Border, as shown in chapter 2. Moreover, the councillors urgently requested additional 500 hand-guns for the Slavonian and 1000 for the Croatian border. It was due to several aspects: there were more salaried units on the Croatian border,[94] Croatian salaried troops were much worse equipped with cold weapons and hand-guns than their Slavonian counterparts; the Croatian border suffered from incessant Ottoman attacks in the 1570s and it was estimated that such weaponry was acutely needed.

Finally, there is the issue of arms race raised in the title of this paper. In this instance, I will focus solely on armament and set aside researches and debates on general development of Habsburg and Ottoman logistics which, eventually, became the determining factor in the arms race between the two powers during the 17th and 18th century.

Studies of Gábor Ágoston clearly exemplified that the Ottomans were acquainted with gunpowder weapons from the mid 14th century, using cannons in numerous 15th century sieges simultaneously to their European counterparts. Ágoston points out that the quality of Ottoman weaponry decreased during the 17th century due to higher productivity and standards of the competitive European war industry.[95] However, he also presents a convincing set of numbers that justify his conclusions that the Ottomans well preceded Europeans in establishing salaried corps of artillery gunners, cannoneers, bombardiers and gun-carriage drivers (from the mid 15th century), that janissaries started to use hand-guns from the time of Murad II and that, in quantitative and qualitative terms, the usage of fire-arms in the Ottoman army skyrocketed during the 16th century. In addition, the Ottomans were able to support these developments by self-sufficient manufacturing of arms and ammunition. It allowed him to make following statements: "...the advantages of a European Military Revolution against the Ottomans remain highly questionable, at least until the late seventeenth century. ... Instead of focusing on the putative military superiority of European arms, future studies must consider the reverse proposition: the impact of Ottoman military strength and prowess on developments among the Ottoman's rivals and contemporaries."[96] Moreover: "...

[94] Registers of salaried units on Croatian and Slavonian Border from the 1550s until the 1580s in: Štefanec, 2011, 465-494 et passim. See also conscriptions from later periods in: Sanja Lazanin – Nataša Štefanec. "Habsburg Military Conscription and Changing Realities of the Triplex Confinium (16th-18th Centuries)." in Drago Roksandić – Nataša Štefanec, eds. *Constructing Border Societies on the Triplex Confinium*. CEU History Department. Budapest, 2000, 91-116.

[95] Ágoston, 1995, 465-485.

[96] Ágoston, 2014, 85-124 et passim, citation 123-124.

Ottoman expansion and military superiority in the sixteenth century played an important role in Habsburg military, fiscal, and bureaucratic modernization ..."[97]

József Kelenik carefully traced various facets of development of firearms on the Hungarian Border in the 16th century.[98] He exemplified how "the 'trace italienne', together with the military tactics relying fundamentally on the mass fire of small arms, namely the two criteria of the military revolution, were not only features of certain West European regions but became everyday routine in warring in the Hungarian war theatre by the end of the sixteenth century." Moreover: "in Hungarian territory between 1593 and 1606 the Habsburg forces had proportionally greater fire power than those of the Low Countries after the tactical reforms of the princes of Orange. ... It is perhaps no exaggeration to claim that the Hungarian theatre of war at that time was among the regions where the military revolution originated or first appeared."[99]

Such reflections are well supported by the development on the Croatian and Slavonian Border. Although better weaponry was in larger quantities still stored in Inner-Austrian arsenals and the Inner-Austrian Estates were reluctant to send it to the Border, there were obvious and significant changes in quantity and quality of weapons requested for the border from the late 1570s. An entire system was optimised to support and promote the usage of firearms. Conduto's register of arms and ammunition on the Slavonian Border made in December 1578 (appendix 5) shows significant improvements in comparison to the register of existing armament made in late summer of 1577. In sum, the importance given to small firearms and artillery resulted with better equipment of Habsburg salaried units and fortresses towards the end of the 16th century.

However, what promoted this development were not only reports on low quality and inadequate quantity of firearms on the border, but, as Ágoston rightly suggests, the Ottoman advantages in this domain. Councillors in Vienna and Bruck in 1577/1578 had on their disposal full insight into the Ottoman military potentials, based on numerous intelligence reports.[100] One was fully aware what needs to be strengthened. Aside from general improvement in logistics, these were the number of fortresses, the number of salaried troops, the proportion of cavalrymen

97 Ágoston, 2010, 110.

98 Kelenik, 1988, 484-520; Kelenik, Sep. 1991, 80-122; Kelenik, Dec. 1991, 1-50; Kelenik, 1990, 85-95.

99 Kelenik, 2000, 118, 158.

100 Summaries of intelligence reports in: KA, AFA, 1577-13-2, 356r-365v; Lopašić, 1884, 44-48. Article based on separate, detailed reports of the Chief Commander of the Croatian Border: Nataša Štefanec. "Osmanski zapovjednici i struktura osmanske i habsburške vojske na hrvatskom dijelu krajišta: prema špijunskim izvještajima iz 1570-ih (Ottoman Military Commanders and the Structure of the Ottoman and Habsburg Military on the Croatian Military Border: Based on Intelligence Reports from the 1570s)." in Marija Karbić - Hrvoje Kekez – Ana Novak – Zorislav Horvat, eds. *Ascendere historiam. Zbornik u čast Milana Kruheka*. HIP. Zagreb, 2014, 209-227.

in salaried units and proper armament of these units with cold weapons, small firearms and artillery. Habsburgs improved in each and every one of those aspects. As in a proper arms race, the register from 1577 shows clear intention to hugely increase the quantity and quality of arms and ammunition on the Military Border, which will prove beneficial in the near future.

BIBLIOGRAPHY

UNPUBLISHED SOURCES

Graz, Universitäts Bibliothek.

Graz, Manuscripten Sammlung, MS 432. (Graz, UB, MS 432)

Graz, Steiermärkisches Landesarchiv, Laa A., Antiquum, XIV, Militaria

Vienna, Kriegsarchiv, Alte Feldakten (KA, AFA)

PUBLISHED SOURCES AND LITERATURE

Ágoston, Gábor. "Az európai hadügyi forradalom és az oszmánok (The European Military Revolution and the Ottomans)." *Történelmi szemle* 37, no. 4 (1995): 465-485.

Ágoston, Gábor. "Empires and warfare in east-central Europe, 1550–1750: the Ottoman–Habsburg rivalry and military transformation." In *European Warfare 1350-1750*, edited by Frank Tallett – D. J. B. Trim, 110-134. Cambridge: Cambridge University Press, 2010.

Ágoston, Gábor. "Firearms and Military Adaptation: The Ottomans and the European Military Revolution, 1450–1800." *Journal of World History* 25, no. 1 (March 2014): 85-124.

Deutsches Wörterbuch von Jacob und Wilhelm Grimm, 16 Bde. in 32 Teilbänden. Leipzig, 1971, 1854-1961 (Online-Version: 06.11.2019).

Finkel, Caroline. *The Administration of Warfare: the Ottoman Military Campaigns in Hungary, 1593-1606*. Vienna, 1988.

Geőcze, István. "Hadi tanácskozások az 1577-ik évben." *Hadtörténelmi Közlemények* 7, no. 1 (1894): 502-537.

Haenel, Erich. *Alte Wafen. Mit 88 Abbildungen, Zweite Auflage*. Berlin: Richard Carl Schmidt & Co., 1920.

von Hoyer, Johann Gottfried. *Allgemeines Wörterbuch der Artillerie: welches die Erklärung aller verschiedenen Kunstwörter, Begriffe und Lehrsätze der*

Geschüzkunst in theoretischer und praktischer Hinsicht, nebst der Geschichte der wichtigsten Erfindungen in derselben, enthält. Tübingen: Cotta, 1804.

Ilijanić, Mira. "Varaždinska oružana i njen inventor." *Godišnjak Gradskog muzeja Varaždin* 2-3 (1962-1963): 31-44.

Iványi, Béla. "A tüzérség története Magyarországon kezdetétől 1711-ig. (The history of artillery in Hungary from the beginning to 1711)." *Hadtörténelmi Közlemények* 29, no. 1 (1928): 152-176.

Kelenik, József. "Szakállas puskák XVI. századi magyarországi inventáriumokban. A terminológia problémái (Harquebuses in the Arms' Inventories of the Sixteenth Century Hungary. A problem of terminology)." *Hadtörténelmi Közlemények* 35, no. 3 (1988): 484-520

Kelenik, József. "A hadügyi forradalom és hatása Magyarországon a tizenötéves háború időszakában. Tények és megjegyzések a császári-királyi hadsereg valós katonai értékéről (The Military Revolution and its Influence in Hungary During the Fifteen Years War. Facts and Notes on the Real Military Value of the Imperial-Royal Army)." *Hadtörténelmi Közlemények* 103, no. 3 (1990): 85-95.

Kelenik, József. "A kézi lőfegyverek jelentősége a hadügyi forradalom kibontakozásában: A császári-királyi hadsereg fegyverzetének jellege Magyarországon a tizenötéves háború éveiben (The Significance of Small Firearms in the Ascendancy of the Military Revolution. Imperial-Royal Army's Armament in Hungary During the Fifteen Years War)," *Hadtörténelmi Közlemények* 104, no. 3. (Sep. 1991): 80-122.

Kelenik, József. "A kézi lőfegyverek jelentősége a hadügyi forradalom kibontakozásában. A magyar egységek fegyverzete a tizenötéves háború időszakában (The Significance of Small Firearms in the Ascendancy of the Military Revolution. The Armament of the Hungarian Units During the Fifteen Years War)." *Hadtörténelmi Közlemények* 104, no. 4 (Dec. 1991): 1-50.

Kelenik, József. "The Military Revolution in Hungary." In *Ottomans, Hungarians, and Habsburgs in Central Europe. The Military Confines in the Era of Ottoman Conquest*, edited by Géza Dávid – Pál Fodor, 117-159. Leiden – Boston – Köln: Brill, 2000.

Klemm, Miroslav. "Prilog istraživanju oružja na Slavonskoj granici u 16. i 17. stoljeću." *Godišnjak gradskog muzeja Varaždin* 6 (1981): 35-47.

Kluge, Friedrich. *Etymologisches Wörterbuch der deutschen Sprache*. Berlin, 1957[17].

Kruhek, Milan. *Krajiške utvrde i obrana Hrvatskog Kraljevstva tijekom 16. stoljeća*. Zagreb, 1995.

Kunz, Peter H.. *Technische Entwicklung der Feuerwaffen 1200 bis 1900: eine Zusammenfassung der wichtigsten historischen und technischen Daten in Texten, Zeichnungen und Bildern*. Zürich, 2008.

Kurrelmeyer, W.. "Kartaune, Kartauwe." *PMLA* 35/1 (1920): 63–75.

Lopašić, Radoslav. *Spomenici Hrvatske krajine*. Vol 1. Zagreb, 1884.

Meyer, Moritz. *Handbuch der Geschichte der Feuerwaffen-Technik*. Berlin, 1835.

Militair-Conversations-Lexicon bearbeitet von mehreren deutschen Officieren redigirt und herausgegeben von Hanns Eggert Willibald von der Lühe, Königl. Sächs. Officier, Vol. 3 (F,G und H). Leipzig: Wigand Verlag, 1834.

Ofner, Josef. "Die Gesellschaft der Rohr- und Büchsenhandlung in Steyr. Ein Beitrag zur Geschichte der Steyrer Waffenindustrie." *Veröffentlichungen des Kulturamtes der Stadt Steyr* 22 (Dec. 1961): 30-44.

Ortenburg, Georg. *Waffen der Landsknechte, 1500-1650*. Bechtermünz, 2002 (1984).

Pálffy, Géza. "Kriegswirtschaftliche Beziehungen zwischen der Habsburgermonarchie und der ungarischen Grenze gegen die Osmanen in der zweiten Hälfte des 16. Jahrhunderts. Unter besonderer Berücksichtigung des königlihen Zeughauses in Kaschau." *Ungarn Jahrbuch* 27 (2004): 17-40.

Pálffy, Géza. "The Habsburg Defense System in Hungary Against the Ottomans in the Sixteenth Century: A Catalyst of Military Development in Central Europe." In *Warfare in Eastern Europe, 1500-1800*, edited by Brian J. Davies, 35-61. Brill: Leiden-Boston, 2012.

Rauchensteiner, Manfried, Manfred Litscher, eds. *Das Heeresgeschichtliche Museum in Wien*. Graz-Vienna: Styria Verlag, 2000.

Reales Staats- und Zeitungs-Lexicon. Foreword by Johann Hübner. Leipzig: Gleditsch Verlag, 1706[2].

Schleicher, Franz Karl. *Handbuch der Artillerie: Erster Theil. Mit Kupfern*. Marburg, 1799.

Simoniti, Vasko. "Cesarska (deželnoknežja) orožarna v Ljubljani." *Kronika. Časopis za slovensko krajevno zgodovino* 36, no. 3 (1988): 159-168.

Simoniti, Vasko. *Vojaška organizacija na Slovenskem v 16. stoletju.* Ljubljana, 1991.

Stanić, Damir. "Bihać kao sjedište Bihaćke kapetanije i slobodni kraljevski grad (Bihać as Seat of Bihać Captaincy and Free Royal City)." PhD dissertation, Faculty of Humanities and Social Sciences, University of Zagreb, 2019.

Štefanec, Nataša. *Država ili ne: ustroj Vojne krajine 1578. godine i hrvatsko-slavonski staleži u regionalnoj obrani i politici*. Zagreb: Srednja Europa, 2011.

Štefanec, Nataša. "Osmanski zapovjednici i struktura osmanske i habsburške vojske na hrvatskom dijelu krajišta: prema špijunskim izvještajima iz 1570-ih (Ottoman Military Commanders and the Structure of the Ottoman and Habsburg Military on the Croatian Military Border: Based on Intelligence Reports from the 1570s)." In *Ascendere historiam. Zbornik u čast Milana Kruheka*, edited by Marija Karbić, Hrvoje Kekez, Ana Novak, Zorislav Horvat, 209-227. Zagreb: HIP, 2014.

Thiel, Viktor. "Zur Geschichte der innerösterreichischen Kriegsverwaltung im 16. Jahrhunderte." *Zeitschrift des Historischen Vereines für Steiermark* 12 (1914): 159-170.

Thiel, Viktor. *Die innerösterreichische Zentralverwaltung 1564-1749. I. Die Hof und Zentralbehörden Innerösterreichs 1564-1625* (Vienna, 1916).

Zedler, Johann Heinrich. *Grosses vollständiges Universal-Lexicon aller Wissenschafften und Künste*, Bd 9 (F). Halle-Leipzig, 1731-1754. (https://www.zedler-lexikon.de/index.html?c=startseite&l=de)

APPENDICES

APPENDIX 1: ITEMS THAT OUGHT TO BE TAKEN FROM THE ARSENAL IN LJUBLJANA AND COLLECTED FOR THE TRANSFER TO THE CROATIAN BORDER (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-10-7)

Verzaichnus, Was aus Ihrer Fr. Dr. etc. zeughauß zu Laybach, genumen vnnd zusammen gelegt werden solle, wie volgt etc.

Ersstlichen Toplhäggen 100. Dartzue khugl 3000. Flaschen darzue 20. Vnnd die darzue gehörige Pöckh 32. Hanndtrör sambt Iren flaschen p. 150. Falckhonen khugl 1200. Toppellt Falckhanöt kugl 1800. Karthaunen kugl 600. Pulluer sockh 27. Pley in platten Cennten 60. Pley in Zain 20 c. Zintstrickh Zennten 2. Ain Pockh oder höbzug Idest 1. Ain waag oder schmirstockh Idest 1. Winden 3. Mospruggen 6. Schlosser Zeug sambt Schraufstockh vnnd seiner Notturfft 1. Zimmermans Werchzeug, sambt vorrath, holz, vnnd Annder Notturfft 1. (1r) Wagner Zeug, sambt Allerley gemachten Rödern zu Falckhonnen, vnnd Falckhonötten Spaichen Naben, felchen, Ax, Lanngkhwidt, vnnd drixlholtz. Ain Schmidzeug sambt ainer veldschmitten vnnd Plaß Palch, auch etlichem übrigem Eisenwerch, Alß schin, Ax, Legeisen, vnnd etlichen übrigen Protznnögl, vnnd Protzn khötten. Mehr etlich Kupferne Plech, zu ladschaufln auch etlichen salzkalben. Huefeisen 1000. Huefnögl 10000. Feuer Pfannen vnnd Lattnen 10. Khummet 50. Windliecht 50. Wagen vnnd Zugscheitten hinder vnnd forder 30.

Schannzzeug. Spitzkrampen 200. Esyen schaufl 300. Allerley Eisen, Prechzeug, stanngen, Kheill, Plätl, hämer, schrötl, schlägl, Ringeisen, vnnd Annders, Cennten 5. Reithauen 150. (1v) Praithauen 150. Maiß oder holtzhagkhen 200.Hanndhagkhen 50. Trag Muelterl zum Schutten, oder an derer Statt souil geflochtner Khörbl 200.

Feuerwerch. Schwebl Cennten 10. Kholl Cennten 1. Pöch Cennten 5. Dartzue auch Allerley Pindstrickh

vnnd Pindtschmer.

Überig Sailberch. Zu denn Falckhonnen Anhab sail 3. Zu denn Falckhonötn Anhab sail 4. Übrig Pämbstranng Zu denn Falckhonen Par 20. Zugstranng Par 60. Sunst auch Allerley Pindstrickh vnnd Pintschmer.

Auf das Fueßvolgkh Lanndtsknechtisch spieß 400. Schmer vnnd Inßlitt Cennten 2. Etliche Poller, Springer vnnd gefenngkhnus Eisen. (2r)

APPENDIX 2: INVENTORY OF GUNPOWDER AND LEAD KEPT IN THE VARAŽDIN ARMOURY AND THE AMOUNT ISSUED FROM THE ARMOURY ON OCTOBER 5, 1578, PROBABLY BY DOMINICO CONDUTO, FOR THE CROATIAN ATTACK AGAINST THE OTTOMANS (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-10-AD1-A)

5. octobris 1578. **Verzaichnus** Was Fur Zeug vnnd Khernpulffer, auch Bley, noch im Zeughauss zw Warassdin verhanden ist, vnd auch was ich aus dem Zeughauss zu dem Crabatischen Zug, Nemblich c. 20 khernpulffer vnd Zwainzig Centn Bley, genumen ist worden, wie hernach volgt,

Erstlichen im Zeughauss zu Warassdin ist noch verhannden Zeugpulffer Zwenvndzwainzig Centn, Idest c 22 pf -. Item ist verhannden kern handtrohr Pulffer Ainvnddreissig Centn, Idest c 31 pf -. Item Bley ist verhannden Funff Centn, Idest c 5 pf -. Item ist auch verhanndten Selyter zwen Startin, Idest 2. (1r) Item die Zwainzig Centn kernpulffer, vnd die Zwainzig Centn Bley, so aus dem Zeughauss zu Warassdin zu dem Crabatischen zug genomen ist worden, Ist zu Agramb gelassen worden, Idest c 20 pf -. Item Bley zu Agramb auch Zwainzig Centn, Idest c 20 pf -. Nota. Ist auch verhanndten vnd zu Agramb ligent die Funffzig Centn Zeugpulffer, so ir Fr. Dr. Erzhörzog Carl zu Österreich zu dem Crabatischen Zug herein verorndt hat, Die gehört irer Höchstgedachter Fr. Dr. zue, Idest c 50 pf -. (1v) Item von den hunderten Handtrhörn, so ich den 14. Marci im 74isten Iar Emphanngen hab Ist noch verhannden zwainzig mit aller irer Zuegehörung, vnnd sindt im Zeughauss zu Warassdin. Idest 20. (2r)

APPENDIX 3: ITEMS RECEIVED TO THE VARAŽDIN ARMOURY BY DOMINICO CONDUTO, ARMOURER OF THE SLAVONIAN BORDER, FROM 1568 UNTIL 1578 (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-10-AD1-B)

5 Octobris 1578. **Verzaichnus**, Was Ich Dominico Contudo, Rom. Kay. Mt. etc. Zeugwart an der Windischen Gränizen fur Municion des 1568isten bis auf dato dits 1578isten Iars Emphanngen hab, Wie hernach volgt.

1568. Erstlichen, hab ich im Namen des Herrn Frannzen von Poppendorf den 13. February von Maister Iobst Puluermacher von Pleyberg Syben Lagl grob Khern Pulffer Emphanngen, Die haben gewegen lauter Pulffer Acht Centn Sybenzig Pfundt, Idest c 8 pf 70.

1570. Item den 5. Augusty hab ich im Namen obnermelts herrn von Poppendorff von Maister Jobsten Khern Pulffer Emphanngen Ainvndzwainzig Centn, Idest c 21 pf -.

1574. Item den 14. Marci, Hab ich zu Petau Emphanngen daß von Wien herein ist verorndt worden Zeug Puluer hundert Centn, Idest c 100 pf -. Item dito Emphangen Khern pulfer vierzig Centn, Idest c 4 pf -.

Bley betreffendt,

Erstlichen den 14 October im 68 Iars hab ich Emphangen Sechs Platen Plei welchs der her Oberist Lucass Zäckhl von Petau her lassen bringen, die haben gewegen Siben Centn, dreyvndneunzig pfundt, Idest, c 7 pf 93. (3r) Item den 16 Nouember im 68isten Iar hab ich im Namen des Herren Poppendorffer vom Iacob Hoffman Flesser Ainvnnddreissig Platen Pley Emphanngen die haben gewegen zwen vnnd vierzig Centn, Sechs Phundt, Idest c 42 pf 6. Item Zuuor im 74isten den 14 Marci Emphanngen Bley hundert Centn, Idest c 100 pf -.

Item dito Emphanngen Funffzig Doppelhackhen, Idest 50. Item Emphanngen Hanndtrhor mit aller irer Zuegehorung hundert, Idest 100. Item klaine Camerstückhlein zehen, Idest 10. Mer Emphanngen Salyter zwen Startin, Idest 2. (3v) Nota. Die Municion Alss uil vber den Emphanng ist aussgedailt worden, hab ich im Zeughauss zu Warassdin gefunden, vnnd hat einer Ersamen Lanndtschafft in Steyr zuegehort. (4r)

APPENDIX 4: ITEMS ISSUED FROM THE VARAŽDIN ARMOURY BY DOMINICO CONDUTO, ARMOURER OF THE SLAVONIAN BORDER, FROM 1568 UNTIL 1578 (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-10-AD1-C)

Verzaichnus, Was Ich Dominico Contuda Rom. Kay. Mt. etc. Zeugwart der windischen Gränizen fur Municion, aus dem Zeughaus Waraßdin ausgetheilt, Daß ich im 1568isten Emphanngen hab, biß auf daß 1578isten Iars, Nach laut des Herrn Oberisten Leytenandt Radtschlag, vnnd der Haubtleuten gegebnen Quittungen. Ist auch des herrn Bischoffen von Agram Quittungen neben miteinkhomen, vermog dessen Irer Mt. etc. genedigisten gegeben beuelch. Wie hernach volgt, vnnd ein yedes Hackhenpulffer ist fur Zeugpulffer gerait worden.

Erstlichen Zeugpulffer, ist aussgethailt worden, Hundert vnnd Acht vnd Neunzig Centn, Dreyvndsibenzig Phundt, Idest c 198 pf 73. Item Kernpulffer, ist ausgethailt worden ainvnndneuntzig Centn vnd drey phundt, Idest c 91 pf 3. (5r) Item Bley ist aussgetheilt worden Hundert viervnndzwainzig Centn Ainlff phundt, Idest c 124 pf 11. Toppelhackhen, sindt aussgethailt worden Hundert vnd zwaintzig, Idest 120. Hanndtrhor sindt ausgethailt worden Achzig, Idest 80. Item klaine Camerstuckh sindt ausgethailt worden Sechs, Idest 6. V o n disn Municion Ist auß Beuelh den Ro. khey. kh. etc. Hohsselligste gdechtnis im 73 Iar den herrn Bischef von Aagramb alß denselben Zeit Baan, außthailt warden, Zeugpulfn Centten 30, Kherndpulfn Centten 10, Topplhaggen 20, Hanndrör 20, Pley Centten 20 (5v)

1576. Item den 12 Iuni, hab ich von dem Merth Hamerl, Rom. Kay. Mt. etc. Feldtzeug dienner zue Pethau Emphangen Zeugpulffer Dreissig Centn, Idest c 30 pf -. Item dito von Mert Hämerl Emphangen Kernpulffer zwainzig Cenntn, Idest c 20 pf -.

Emphanng, Alles obermeltes Pulffers Thuet in Summa Zeug Pulffer c 130 pf -. Kern pulffer c 89 pf 70. Bley, Betreffendt, c 149 pf 99 (6r)

APPENDIX 5: INVENTORY OF ALL ARMS AND AMMUNITION STORED ON THE SLAVONIAN BORDER, MADE BY ARMOURER IN VARAŽDIN, DOMINICO CONDUTO, DECEMBER 6, 1578 (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-12-4)[101]

Verzeihnuß Allerley Geschuz, An der Windischen Greinizen, Klein Vnnd Groß, Zeug Pulffer Khern Pulffer Kugel vnnd Pley, vnnd Annders Wie hernach volgt. Geschech den 6. December 1578isten.

Erstlich Warasyn ist verhanden gewest Zwo Singerin Auff Reder, mit Aller Ir Zugehörung Als Naimblich 50 Zenten Zeug Pulffel, das ir Furstlich Durchleucht, herain von Granz Verordnet hat zu der Krabatischen Zug. Vnd Sechs hundert Kugl, Zug Sail, vnd Ander Zuegehörung, Des obenbemelt geschuz vnd Manizion ist zu Agram beliben, Idest 2. Khugl Sechs hundert, Idest 600. Item Zeug Pulffer funffzig Zenten, Idest 50 c. Item ist verhanden funff gegosnen falkhan Auff Reder Darzue nihts mer. Als Prutzenwagen, Ladschaifl, vnd Wischer. Kein Zug sayl, vnd khain Keten, Idest 5. Item ist verhanden Funff gegosner falkhanetl, darzue nihts Anderst Als Ladschaifl vnd Wischer, Idest 5. (2r) Item ist verhanden Ain gosnen scharfettydl Auff Reder, Idest 1. Item ist verhanden Ain gros Eisen Stainpigksen Auff Reder, Idest 1. Item ist verhanden Zway Eysene stuckh Auff Reder daran draier genanndt, Idest 2. Item ist verhanden Ain gegosner Paller Auff Reder zum feur Werkh, Idest 1. Item ist verhanden, dreyzehen Toplhakhen mit schwarzen schafft, Idest 13. Item ist verhanden, ganzen Eysen Toplhackhen mit khrumpen schwanz füer, Idest 4. Item ist verhanden, Lantskhneht Rör sambt ir Zugehör, drey Vnd dreisig, Idest 33. Item ist verhanden, hairamya handt Rör füer vnd fürzig, Idest 44.

Zeug Pulffer. Erstlich Zeug Pulffer ist verhanden Zwayvndzwainzig Zenten, Idest 22 c. Item ist Verhanden khern Pulffer Achtvndzwainzig Zenten, Idest 28 c. (2v) Item ist verhanden Zway Startyttin Sallitter, Noch sain Numer ist Sechzehen Zenten, Idest 16 c. Item ist verhanden fünff Zenten Pley, Idest 5 c. Item Khugl für die funff Falkhaner ist verhanden, Siben hundert, Idest 700. Item Für die Fünff Falkhanetl ist verhanden dray hundert, Idest 300. Item scharffatindl Khugl saint verhandenn für hündert, Idest 400. Item ist verhanden für die Zway darndrayer sechs hundert, Idest 600. Item ist verhanden Alle faitterisch Toplhackhen, die nihts fil besunders Zu Prauhen, Idest 50. Item ist verhanden Sechs hundert Lantskhnecht Schpies, Idest 600. Item ist verhanden Etlih Alte sahen die ich niht Aufzeihnen wil, die nihts Zuprauhen ist. (3r)

[101] Inventories of arms and ammunition in arsenals (*Zeughaus*) in Gorica/Gorizia, Neustadt and Vienna: Vienna, Kriegsarchiv, Alte Feldakten, 1557-2-11, 1557-2-12, 1557-2-14. Inventory of arms and ammunition in arsenal (*Zeughaus*) in Trieste/Trst: Vienna, Kriegsarchiv, Alte Feldakten, 1563-11-ad10. See also report of Wolf Schneitsperger, Zeugwarrt in Trieste/Trst: Vienna, Kriegsarchiv, Alte Feldakten, 1563-11-10).

Khaprainiz Manizion. Erstlich ist verhanden, Ain gegosne Falkhan Auff Reder, niht mer darzue Als Ladschaifl, vnd Wischer. Vnd das bemelt falkhan man hat so vil brauht Zum Krait schisen das man hat das Zing loch faintlich Ausprent, vnd hat noh Ander mer schaden, das die Pygsn Mayster nimer Verthraun mit khugl daraus schisenn, Idest 1. Item ist verhanden Ain Eysen stuckh Auff Reder daran draier genandt in Wendig Vvll mit schiffer, in Zait der not megen niht lang prauhen, Idest 1. Item ist verhanden zway Topelt falkhanetl, Idest 2. Item ist Verhanden Ainfaht falkhanetl goßne Auff Reder, Idest 2. Item ist Verhanden drey gosne scharfath Auff Reder, Idest 3. Item ist verhanden Ain Eysne scharfatindl Auff Reder niht besunders zu Prauhen, Idest 1. (3v) Item ist verhanden, füervndfünffzig Toplhackhen, Ain Thail ist finnten Zupesern, Idest 54. Item ist verhanden Lantskhneht Rör Zway vnd fürszig, Idest 42.

Zeug Pulffer. Item Zeug Pulffer Zwayvndzwainzig Zentn, Idest 22 c. Item ist verhanden khern handtror Pulfer dray Zenten, Idest 3 c. Item ist verhanden Toplhackhen Pulffer drey Zenten, Idest 3 c. Item ist verhanden Funff Zenten Pley, Idest 5 c. Item ist verhanden Falkhane Kugl Zway hundert, Idest 200. Item ist verhanden Toplt fakhanetl kugl dray hundert, Idest 300. Item ist verhanden Ainfaht falkhanetl kugl fürhundert, Idest 400. (4r) Item ist verhanden scharffatindl khugl Zwayhundert, Idest 200. Item ist verhanden Toplhakhen khugl Zwaythausent, Idest 2000. Item ist verhanden Alt faiterisch sahen, die ich niht Aufzaihnen Will die niht Zu Prauhen sint.

Iuainnitscher Manizion. Erstlich ist Verhanden für gegosner falkhanetl, Zway sint mit gueten schafft perschlagne vnd Reder, vnnd die Zway sint khierzer Aber schiesen Als mit Ain Pley, es sint Reder vnd schafft nihts wert, Idest 4. Item ist verhanden Ain gosne scharfatindl Auff Reder, Idest 1. Item ist verhanden Ain Eysne Messer zum Khrait schiesen Idest 1. Item ist verhanden Zway klain khamer stickl Auch Zum Khrait schiessen, Idest 2. Item ist verhanden Zway vnd draysyg Toplhackhen, Idest 32. Darunter saint Acht Vngeschifft. (4v) Item ist verhanden fier vnd draizig Teütsch Handt Rör, Idest 34. Item ist verhanden Zeug Pulffer Zehen Zenten, Idest 10 c. Item ist verhanden khern Pulffel drey Zenten, Idest 3 c. Item ist verhanden Toplhacken Pulfer Zwo Zenten, Idest 2 c. Item ist verhanden fünff Zentn Pley, Idest 5 c. Item ist verhanden falkhanetl Kugl fierhundert, Idest 400. Item ist verhanden Zway tausent khugl zum Toplhacken, Idest 2000.

Khrauz Mannizion. Erstlich ist verhanden fier gosne falkhanedl Auff Reder, vnd Ain gosne scharffatindl Auh Auff Reder, Thuet gegosne stickl finff, Idest 5. Item ist verhanden Zway Eysen scharfatindl Auf Reder die niht vil besonders Zubrauhen saint, Idest 2. (5r) Item ist verhanden Zway khlain Khamer stickl, zum Creit schiesen, Idest 2. Item ist verhanden dray ganze Eysen Toplhacken mit khrumpen schwanz, Idest 3. Item ist verhanden fürzig Toplhackhen, die guet zu prauchen sint in Zait der Not, Idest 40. Item ist verhanden Teutsch Rör mit Ir Zuegeherung Aht

vnd Zwainzig, Idest 28. Item ist verhanden für Argl, Mit sehssehen Rör Alle für, Idest 4 Argl.

Pulffer Betreffendt. Erstlich Zeug Pulffer ist verhanden Neun Zenten, Idest 9 c. Item ist verhanden khern Hanndt Rör Pulffer fier Zenten, Idest 4 c. Item ist verhanden für Zenten Pley, Idest 4 c. Item ist verhanden khugl fier die falkhanetl Sibenhundert, Idest 700. (5v) Item ist verhanden scharfatindl khugl hundert vnd fünffzig, halbe thail mit Eisen schrat vnd Pley Iber gosen, Idest 150. Item ist verhanden Toplhackhen khugl Zway Tausent, Idest 2000. Item ist verhanden fallkhaner khugl hundert vnnd fünffzig, der stuckh ist zerschprengt, ist Ain Eysen stuckh gwest, Idest 150 K. Item ist verhanden Lantsknecht schpies sechs vnd Neunzig, Idest 96.

Aggram Mannizion. Erstlich ist verhanden Zway gegosne falkhaner mit All ir zugehörung, Aber die Zugseil sint in Khrabatischen Zug Alls zu Risen vnd Zu Prochern, Idest 2. Item ist verhanden fierzehen Saum falkhaner khugl, vngefairlich sechs hundert, Idest 600. Item ist verhanden Achtzehen Zentn Zeug Pulfer, daß der her Obrister Zeug Meister hat zu den Zway Falkhan verordnet, Idest 18 zu den Krabatischen Zug. (6r) Item ist verhanden Ain Eysne Falkhan Auff Reder, Idest 1. Item ist verhanden Zway New Thopelte falkhanetl gegosne, gar Ibel geschifft vnd Noh kindisch beschlagen, vnd niht Wol ausbart, Idest 2. Item ist verhanden fier falkhanetl Auff Reder, gegosne seine schafft nihts wert, Idest 4. Item ist verhanden Drey gegosne khamer stickhl Auff Reder, Idest 3. Item ist verhanden fier Eysne scharffatindl Auf Reder die niht vil besonders sint, Idest 4. Item ist verhanden Zwo grose vnd Zway klain Meser, Idest 4. Item ist verhanden Zway vnd sehzig Toplhackhen guet vnd Peß, Idest 62. Item ist verhanden Zehen Teutsch handt Rör, Idest 10. Item ist verhanden Zeug Pulffer fierzehen Zenten, Da vier Etlich Iar Erlegt ist worden, Idest 14 c. (6v) Item ist verhanden Zwainzig Zenten Khern handt Rör Pulffer, daß ih hab mit mier von Warasin genumen vnd in Khrabaten gefiert, vnd darnach zu Agram gelasen, Neben Andern Manazion, Idest 20 c. Item ist verhanden Zwainzig Zenten Pley die ih von Warasin Auff Khrabatischen Zug gefiert hab, vnd darnach zu Agram gelasen, Idest 20 c. Item ist verhanden, fier hundert falkhanetl kgugl, Idest 400. Item ist verhanden fier Toplt falkhanetl kgugl -, Idest 0. Item ist verhanden Topl hackhen khugl fünffzehen hundert, Idest 1500. Item ist verhanden Lantskhneht schpies fierzig, Idest 40. Item ist verhanden fierzig Alt faiterisch Toplhackhen Rör, die nihts wert sint, Idest 40. Das obbemelt Manazion die Purger vermaint es kert Inen Zue. Alle. (7r)

Sant Iergen Geschloß. Erstlich ist verhanden Ain gegoßne falkhan Auff Reder ist gar khrump, ist vnmiglich das die Pixsnmaister khan gar khain Reht schuß daraus Thain, Idest 1. Item ist verhanden Zway Thoplt gegosne falkhanetl, Auff Reder, Idest 2. Item ist verhanden Ain Eysen stuckh wie Ain Toplt fakanedl, Idest 1. Item ist verhanden Ain Aysen scharffatindl Auff Reder, Idest 1. Item ist

verhanden Ain Eysen Poller Auff Reder Zum khrait schiesen, Idest 1. Item ist verhanden Topl hacken guet vnd Pes dreisig, Idest 30. Item ist verhanden Teutsch handt Rör fierzehen, Idest 14. Item ist verhanden Zeug Pulffer Zehen Zenten, Idest 10 c. Item ist verhanden khern hanndt Rör Pulffer Sechs Zenten, Idest 6 c. Item ist verhanden siben Zenten Pley, Idest 7 c. (7v) Item ist verhanden gkugl zu den falkhana hundert vnd fünfzig, Idest 150. Item ist verhanden fuer die Zway Toplt fakhanetl khugl Zway hundert, Idest 200. Item ist verhanden fier die Zwen Eysen Stykl khugl Achtzig, Idest 80. Item ist verhanden Toplhaken khugl füer hundert, Idest 400.

Schkhardt Eysser Petreffendt. Erstlich Zu der draw Auf derna ist verhanden Topl hakhen sehzehen die maist die saint Zu bessern, Idest 16. Item ist verhanden Zway khlain khamer stykhl zum Creit schiesen, Idest 2. Item ist verhanden Zway Eysen Toplhackhen mit khrumpen schwanz, Idest 2. Item ist verhanden Ain Argl mit drein Rör saint niht fill besunders, Idest 1. Item ist verhanden Zeug Puluer Ein Zenten, Idest 1 c. Item ist verhanden khern Puluer finfvndzwainzig pfundt, Idest 25 pf. (8r) Item ist verhanden Zum Toplhackhen khugl Zway hundert, Idest 200.

Zu Lagkh An der Dra. Erstlich ist verhanden Aindlaff Toplhacken, Idest 11. Item ist verhanden Ain khamer stykhl zum krait schisen, Idest 1. Item ist verhanden Zeug Puluer Ain Zentn, Idest 1 c. Item ist verhanden Zum Toplhackhen khugl Zway hundert, Idest 200. Item fier die Zway schkhart Eyser man gibt allweg manazion, Von Kaprainiz wans fanaten ist hinaus 1.

Thopelhoffets. Erstlich ist verhanden sehzehen Toplhakhen, Idest 16. Item ist verhanden Zway khlain khamer stykl zum Crait schiessen, Idest 2. Item Zeug Puluer Ein Zenten, Idest 1 c. Item khern Puluer Ein halbe Thuna, Idest 1 Thuna. Item Pley finffvndzwainzig Pfundt, Idest 25 pf. (8v) Item Zum Toplhackhen khugl zway hundert, Idest 200.

Sannt Petter. Erstlich ist verhanden Zehen Toplhakhen, Idest 10. Item ist verhanden Zway khlain khamer styckhl zum Creit schiessen, Idest 2. Item Zeug Puluer ist verhanden Ain halben Zenten, Idest 0,5 c. Item ist verhanden khern Puluer Ain halben Zenten, Idest 0,5 c. Item ist verhanden Ain Zenten Pley, Idest 1 c.

Zyrkhwena. Erstlich ist verhanden Toplhackhen fierzehen, Idest 14. Item ist verhanden dray khamer stykl zum Creyt schiesen, Idest 3. Item Zeug Puluer ist verhanden Anderthalb Zenten, Idest 1,5 c. Item khern handt Rör Puluer ist verhanden Ain Zentn, Idest 1 c. Item ist verhanden Pley Ain Zentn, Idest 1 c. (9r) Item Zu Zyrkhwena ist fenoten (vonnöten, N.Š.) Zwey Toplt fakhanetl, Idest 2.

Graydetz. Erstlich ist verhanden Zwey fakhanetl Auff die Reder, Idest 2. Item ist verhanden Aindloff Toplhakhen, Idest 11. Item ist verhanden Zway khamer stykhl zum Creyt schiessen, Idest 2. Item ist verhanden Zeug Puluer Zway khleine Thuna, Idest 2 Thuna. Item ist verhanden khern Puluer Eine Zenten, Idest 1 c.

Item ist verhanden Pley Anderthalben Zentn, Idest 1,5 c. Item ist verhanden khugl zu den Zwen falkhanetl Zway hundert vnd funfzig, Idest 250. Item ist verhanden Toplhackhen khugl fierhundert, Idest 400. **Nota** Fur Die Obmelte schkhart Eyser gibt man Alwegen Manazion Von Creuz hinaus wans faneten ist. (9v)

Iuannytscher Khlasster. Erstlich ist verhanden Zwelff Toplhakhen, Idest 12. Item ist verhanden Zway Eysen Stykhlin Auff Reder die niht fill bsunder zubrauchen sindt, Idest 2. Item ist verhanden Ein gklain gegosne schtiklin Auff Reder schafft vnd die Reder nihts vill besunders, Idest 1. Item ist verhanden Zeug Puluer Ein Thuna, Idest 1. Item ist verhanden khern Puluer 0. Item dreyzig Pfunt Pley, Idest 30.

Heyllig Khreyz. Erstlich ist verhanden Toplhackhen Achte, Idest 8. Item ist verhanden Ain klein stykhlin Auf Reder die niht vill besunders ist, Idest 1. Item Zway klein khamer stykhl ist verhanden zum Creyt schiesen, Idest 2. Item ist verhanden Ain Thuna Zeug Puluer, Idest 1 Th. Item ist verhanden Pley Zwainzig Pfunt, Idest 20 pf. **Natto** Von den schkhart Eyser gibt man Alwegen Manazion von Iuuannytsch hinaus, wans Alwegen fanoten ist.

Dominico Conduta, Zuigbordtt mano pp (10r)

Alles geschuz vnnd Munition, was Allenthalben, Auf der gannz Windischen gräniz vorhannden ist, so mir der Zeugwarth zu Waraßin Dominico Conduto, zu den 14 December zuegeschickht (10v)

APPENDIX 6: ITEMS REQUIRED FOR TRANSPORT OF 2 SINGERIN FROM VARAŽDIN TO THE CROATIAN MILITARY EXPEDITION (VIENNA, KRIEGSARCHIV, ALTE FELDAKTEN, 1578-13-8)[102]

Verzaichnus, der Zwayer Singerin Sambt Irer Munition, So von Warasdin auf die Crabattische Expedition füeret. Erstlich die zway Stukh, auf Iren Plochwägen, vnndt Nach dem die Roß Schwach vnnd Khlain sind, mueß für Yede gespannt werden 30 Roß, thuet Roß 60. Zu füerung der zwayer gefäß für Yedes 10 Roß, thuet Roß 20. Zu füerung der 600 khugln Yede 46 khugl auf ain wagen für Yedes Sechs Roß, thuet dreyzehen wagen vnnd Roß 78, Wagen 13. Zue füerung der funffzig Centen Zeugpuluers fünff wägen, thuet Roß 30, Wagen 5. Zu Füerung zwainzig Cennten gekhürnnts Puluer zwen wagen, thuet Roß 12, Wagen 2. (5r) Zu füerung zwainzig Cennten Plei zwen wägen, thuet Roß 12,Wägen 2. Zu füerung der Moßbruggen zwen wagen, thuet Roß 12,Wagen 2. Zu füerung deß Schanz zeug, zwen wägen, thuet Roß 12, Wagen 2. Zu füerung der wagner, Zimmerleüth vnnd dergleichen werchzeug ain wagen, thuet Roß 6, Wagen 1. Zu Füerung übriger Räder vnnd Äx, vnnd dergleichen holzwerch zwen wägen, thuet Roß 12, Wagen 2. Zu füerung dikher Pretter oder laden zum Bruggnen zwen wägen, thuet Roß 12, Wagen 2. Zu füerung des hebzugs ain wagen, thuet Roß 6, Wagen 1. Zu füerung der Zelten ain wagen, thuet Roß 6, Wagen 1.

Summa der Roß 276, vnnd was an den Rossen abgeet Solle mit Oxen erstattet warden.

Summa 33 Wägen. (5v)

Nach dem aber der herr Baan den Waraßdinern nit mer alß dreissig Wägen auferlegt, Solle der zeugwart bedacht sein ettliche Sachen einzuspikhen, vnnd auf ain Wagen den andern zu hilff, biß in die Aindleff Cennten laden. Dan Seind auh 6 Scheff vnd vier wägen zue disen geschuz zue Warasdin gewesen, die ziehen auch mit etc. (6r)

[102] See also: Register of all arms and ammunition used in the so called Croatian Expedition against the Ottomans, made on October 25, 1578, KA, AFA, 1578-10-6, 1r-16r; Register of Styrian, Carniolan and Carinthian cavalry for the Croatian military expedition against the Ottomans, KA, AFA, 1578-13-7.