

Jakub M. Niebylski¹

FORTIFIED STRONGPOINT OF THE RUSSIAN ARMY FROM THE 1914 OFFENSIVE ON KRAKÓW AT RACIBOROWICE-PRAWDA, SITE 3, KRAKÓW DISTRICT (S. POLAND)

ABSTRACT

Niebylski J. M. 2024. Fortified strongpoint of the Russian Army from the 1914 offensive on Kraków at Raciborowice-Prawda, Site 3, Kraków District (S. Poland). *Sprawozdania Archeologiczne* 76/2, 399-453.

The paper discusses a previously unknown earthwork of a fortification of the First World War found in the investigation of a barrow at Site 3 in Prawda in Raciborowice (Kraków district). The discovery consisted of a fortified strongpoint for all around defence enclosing the top of the barrow. It was built by the Russian troops during the offensive on Kraków from November to December 1914, after the strategic retreat of the Austro-Hungarian army towards the south, under the cover of the fortress artillery, ending the Battle of Kraków. The paper fills the gap in knowledge about the combat taking place between the Battle of Kraków and the battles on the right bank of the Vistula River, enabling the reconstruction of those events and giving insight into the material culture of the soldiers participating in them.

Keywords: artillery, barrow, Battle of Kraków, Kraków Fortress, field fortifications, First World War
Received: 09.01.2024; Revised: 14.06.2024; Accepted: 06.06.2024

¹ Institute of Archaeology and Ethnology, Polish Academy of Sciences, Sławkowska str. 17, 31-016 Kraków, Poland; j.niebylski@iaepan.edu.pl; ORCID: 0000-0002-6507-6087

INTRODUCTION

Site 3 at Prawda is part of the village of Raciborowice, Michałowice commune near Kraków. A mound here had been described in 1935 by Julian Piwowarski as being related to the Trzciniec culture (Piwowarski 1935, 180, giving the location as Wiktorowice, Luborzyca commune). The multicultural archaeological site was registered by Eligiusz Dworaczyński in 2008 during the field survey (Polish Archaeological Record, Polish name: Archeologiczne Zdjęcie Polski – AZP, region number: 101-57). Due to the need to conduct rescue excavations in advance of the construction of a section of the S7 expressway, the site was investigated by the Polish Atelier for Monuments Conservation (Polish abbrev. PPKZ S.A.), and the firm ‘Galty’ (Usługi Ziemno-Inżynieryjne Paweł Micyk), at the request of the General Directorate for National Roads and Highways (Polish abbrev. GDDKiA). The archaeological investigations were carried out in 2016-2017 and further in 2020, as a result of which an area of 829 ares was examined and 711 archaeological features were discovered. Among those close to the barrow, 47 features and 50 artefacts were dated to the period of the First World War (Fig. 1B: 1).

OUTLINE OF WRITTEN SOURCES FOR FIRST WORLD WAR EVENTS IN THE VICINITY OF PRAWDA, SITE 3

In 1914, the area of the archaeological site became the theatre of operations for the belligerent armies of the Russian Empire and the Austro-Hungarian Monarchy (Niebylski 2021a, 34). This was related to the activities on the Eastern Front of First World War, which in 1914 were characterised by variable successes for the parties involved in the fight. In the last week of October, a general retreat of the Austro-Hungarian troops began. The Russian offensive following the opponent was so strong that it was called a ‘steam roller’ (Niebylski 2020a, 557).

The aim of the new Russian offensive was blocking Kraków, threatening Silesia and then opening ways deep into the Austro-Hungarian Monarchy, to Vienna (von Horstenau 1932, 341-516; Bator 2008, 119; Orman and Orman 2008, 39-41; Łukasik 2009, 47). Kraków, similarly to Przemyśl, was a fortress, consisting of numerous objects of a defensive character.

The Austro-Hungarian 4th Army aimed at defeating the Russian troops in the battle that was planned to be fought on the line Słomniki-Proszowice. That operation was scheduled for 16 November (Bator 2008, 126). By that time, the Russian troops had advanced further west and southwest than expected.

The military struggles in the Battle of Kraków were conducted from 16 November with varying intensity and success for the involved parties. Due to the failure of 39th Honvéd Infantry Division on the Proszowice-Koszyce line and the reinforcement of the Russian

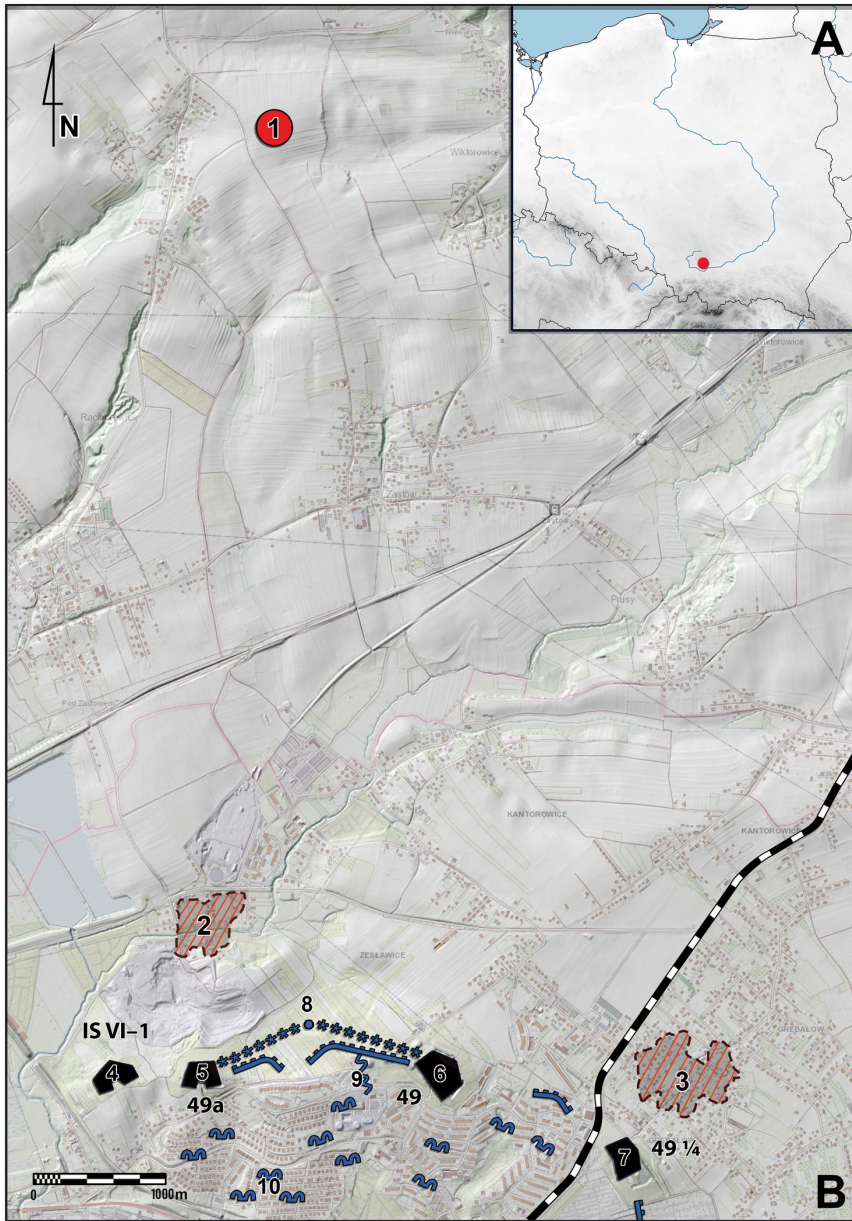


Fig. 1. Location of the Raciborowice-Prawda, Site 3. A. Location on the map of Poland; B. Detailed location of the barrow and field fortifications, as well as permanent ones associated with the Kraków Fortress in 1914: 1 – the barrow in Raciborowice-Prawda, Site 3, 2 – burnt village of Zesławice, 3 – burnt village of Grębałów, 4 – infantry sconce IS VI-1, 5 – Fort no. 49a 'Dłubnia', 6 – Fort no. 49 'Krzesławice', 7 – Fort no. 49 1/4 'Grębałów', 8 – wire obstacle, 9 – firing trenches and a communications trench, 10 – artillery batteries. Designed by J. M. Niebylski, drawn by K. Przybysz-Malczewski, adapted from RGVia, Fond 2067

troops with additional forces sent by the 3rd Army, the Austro-Hungarian 4th Army was moved closer to Kraków so that it would be under the cover of the fortress artillery and protect the foreground of the Fortress itself. That strategic retreat began on 26 November and lasted until 28 November, concurrently ending the battle. The Russian side did not undertake an armed pursuit due to the secrecy of the retreat manoeuvre as well as the weakening of its troops.

ARMED ACTIONS AFTER THE END OF THE BATTLE OF KRAKÓW: THE CASE OF PRAWDA BARROW

The area abandoned by the Austro-Hungarian army, about 5 km long, had extensive field fortifications in the northern part, which were occupied by the Russian army. Certainly, at the turn of November and December, both involved parties began to build new field fortifications in places corresponding to the new front line, which at the end of November, in the case of the Russian troops, was based on the village of Brzozówka-Michałowice-Prusy-Wyciąże, Kraków district, bringing it close to the area of Prawda, Site 3 (*Feldzug...* 1917, 44; Veltzé 1919, 513). The barrow was then referred to as Hill 305 (German: Höhe 305/Kote 305; *Viribus...* 1919, 102). The defensive units of the Fortress who were designated to occupy that area, were initially the Austro-Hungarian 1st and 110th Landsturm Infantry Brigade and 106th Landsturm Infantry Division, and then, after moving the 1st Brigade to the terrain of the Fortress and 110th Brigade to the west, it was solely the 106th Division that remained in the area (*Feldzug...* 1917, 90-92; Ehnl and von Sacken 1938, 244, 288, 289, 293, 294). The fighting in the area in question lasted for the first two weeks of December. They took place on the border of the effective range of the artillery of the fortress. The aim of the Russian troops was to blockade the Kraków Fortress from the north, north-east and the east. Already on the afternoon of 30 November, the artillery of Fort no. 49a 'Dłubnia' and Fort no. 49 'Krzesławice' responded with fire, shelling the enemy from a considerable distance, which in combination with the raids of the fortress garrison resulted in keeping it at a distance (Veltzé 1919, 18). At that time, two Russian high-explosive shells hit Fort no. 49 'Krzesławice' (*Österreichisch-Ungarische...* 1915, 4). In response, Fort no. 49a 'Dłubnia' and Fort no. 49 1/4 'Grębałów' responded with artillery fire and in order to reach the enemy, they moved their mobile batteries with the support of infantry. That artillery exchanged fire lasted until 5 December (*Österreichisch-Ungarische...* 1915, 4; *Viribus...* 1919, 101, 102). On the basis of the data of the Russian intelligence, it is known that between Fort no. 49a 'Dłubnia' and Fort no. 49 'Krzesławice', a continuous wire obstacle was set up, as well as two firing trenches. The eastern trench had a zigzag profile communications trench leading from it to the south. An analogous wedge-shaped firing trench was located between Fort no. 49 'Krzesławice' and Fort no. 49 1/4 'Grębałów'. In the background of those three forts, 12 batteries of artillery were located

(Fig. 1B: 4-10; RGVia, Fond 2067). Thus, that section of the fortifications, in addition to the permanent defences, had a well-developed network of field fortifications. In order to bind the opponent by engaging in combat, on 2 December, the Austro-Hungarian 110th Landsturm Infantry Brigade was ordered to carry out an attack towards Hill 305, *i.e.*, the barrow in Prawda, which was occupied by the Russian troops. The attack in question was supported by mobile heavy artillery batteries (*Österreichisch-Ungarische...* 1915, 4; *Viribus...* 1919, 102). On the night of 4 December, from the main post north of Prawda, in a bayonet fight, an Austro-Hungarian Sergeant, Franz Spirk, and his platoon fought off, a powerful enemy patrol that attacked them (*Ehrenhalle...* 1917a, 134). On 5 December, the fighting for the hill in Prawda, on which the barrow is located, was continued. Another attack on the hill was entrusted on that day to the Austro-Hungarian 35th and 110th Landsturm Infantry Brigades, which was supported by the fire of five mobile heavy artillery batteries under the command of Major General Aust. Those brigades were ordered to carry out an assault after dusk, from the area of Kocmyrzów, *i.e.*, from the east (*Österreichisch-Ungarische...* 1915, 4; *Viribus...* 1919, 102). The person who was awarded for skilful and prudent securing of the left flank of troops on that hill was an Austro-Hungarian Captain Johann Lappat, the commander of 36th Landsturm Infantry Battalion (*Ehrenhalle...* 1916c, 79). Already on 7 December, within the range of the fortress artillery, no enemy activity was detected in the northeast and east directions, which was considered to be a re-deployment of their troops to the other side of the Vistula River (*Österreichisch-Ungarische...* 1915, 4; Veltzé 1919, 18, 19). In the area of Prusy, the fighting was still ongoing on 11 December (*Ehrenhalle...* 1916b, 43). On that day, the Russian troops carried out a strong night attack, for which Paul Czernysz was awarded due to his brave defence and notifying in time both the main post and the crew of Fort no. 49 1/4 'Grębałów' about that emergency (*Ehrenhalle...* 1917b, 23). As a result of those battles, the area of the village of Raciborowice and the hamlet of Prawda were regained and the Russian troops were repelled.

During this combat, on 2 December, the fighting was shifted to the southern bank of the Vistula River, where the Austro-Hungarian forces attacked the Russian 3rd Army advancing towards the Kraków Fortress (Arz von Straußenburg 1924, 42). The fortress artillery played a significant role in those engagements that continued until 6 December and stopping the Russian troops, avoiding the blockade of Kraków (*Heldenwerk...* 1917, 219; Schäfer 1934, 96; Urbanski von Ostrymiecz 1939, 298, 307). Its consequence was moving the front line away from the city in the southeast direction, and then, the Russian troops were driven out of Galicia (Niebylski 2020b, 263, 264; 2021b, 303, 304).

War losses

As a result of the Battle of Kraków, which took place in that area, there were great material and personal losses of both fighting parties. The Austro-Hungarian army, in order to prepare the foreground for the fortress artillery, completely destroyed the buildings in the

village of Grębałów (Łukasik 2009, 162). The built-up area of the village of Zesławice, Kraków district, was also completely damaged (Fig. 1B: 2, 3). In the Austro-Hungarian 1st Army, about 30.000 soldiers were killed, wounded or became ill during the fighting, while in the 4th Army, the number was over 20.000. At that time, 16.000 Russian soldiers were held captive as prisoners of war. During the War, there were 120 hospital outposts in Kraków, including a garrison hospital, ten fortress hospitals consisting of several outposts, three epidemiological hospitals and ten reserve hospitals (Łukasik 2009, 67, 68).

The deceased soldiers were buried in individual and mass graves, and later, their remains were reburied during exhumations of temporary graves; they were laid in war cemeteries and quarters. For example, in Luborzycza, Kraków district, before the exhumations, a grave was located in a local cemetery, 6 km away from the barrow. Forty soldiers were buried there, including 34 Austro-Hungarian ones, some of whom had died in the Field Hospital no. 8/14 in Kocmyrzów (*Verlustliste... 1915*, 11; Pałosz 2012, 343, 357). Based on the documents concerning the news about the wounded and sick soldiers (German name: *Nachrichtenüber Verwundete und Kranke*), it was also possible to establish that men whose surnames we know were present there but, as a result of the sustained wounds and diseases, died and were buried in the same grave, then referred to as Kocmyrzów, Kraków district (*Nachrichten... 1915; Ehrenhalle... 1916a*, 41). These data indicate that the prevailing kind of injuries of soldiers fighting in the foreground of Kraków was a gunshot wound, mainly to the stomach, constituting 39.4% of all injuries and ailments. A small number of the hospitalised had received head and neck shots, amounting to only 18.2% of all the injuries and ailments, indicating the nature of the fighting in that area, taking mainly the form of numerous assaults, rather than trench warfare type of combat. After the exhumations of these remains, there are currently three war cemeteries in the area of Prawda – no. 391 in Kocmyrzów (5.5 km away) designed by Lieutenant Hans Mayr and planned at the site of the earlier burials in Baran, no. 399 in Prusy, designed by Lieutenant Karl Korschmann (3 km away) and no. 400 in the same place, also designed by Korschmann (3.5 km away; Schubert 2018, 188, 197, 198).

Features – field fortifications

At the site, 47 features dated to First World War have been discovered (Figs 2 and 3). Six of them have been dated by their artefactual content, while 41 by analogy with the adjacent features, taking into account the shape of the plan and cross-section, orientation and the nature of the fill. The following features have been dated artefactually: Nos 379, 484 (together with its part named Feature 483), 503, 509, 510 and explosion crater located in Feature 534 (the latter itself being of older chronology). The following features have been dated by analogy: Nos 402, 496-499, Feature 501, 502, 505, 506, 544-554, 571-574, 593, 598-611, 613, 614 and 714. In the immediate vicinity of three other features (Features 34, 40 and 41), artefacts dated to First World War were also discovered, but they got there

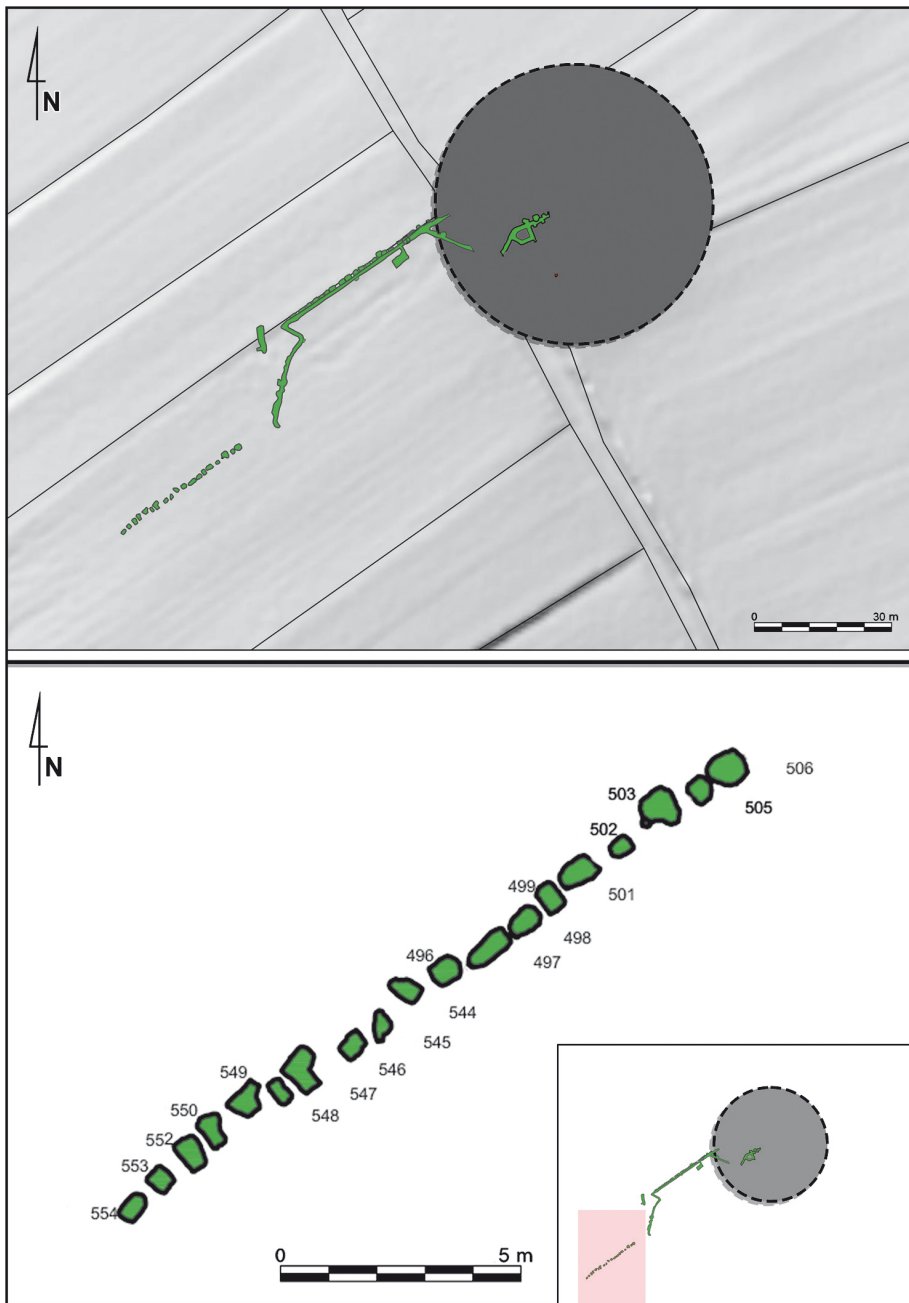


Fig. 2. Raciborowice-Prawda, Site 3: upper panel – location of field fortifications related to First World War and location of the barrow, lower panel – close-up of the western cluster of field fortifications. Graphic created by K. Przybysz-Malczewski

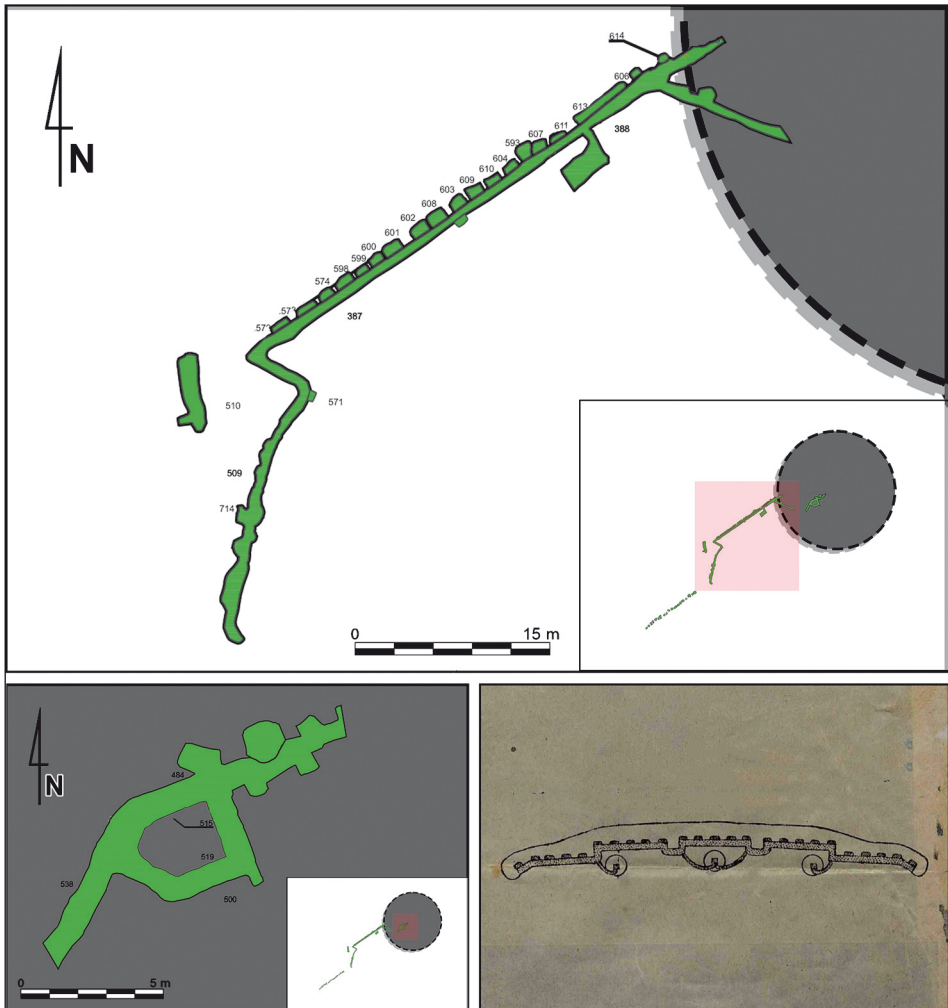


Fig. 3. Raciborowice-Prawda, Site 3: upper panel – close-up of the central cluster of field fortifications, lower-left panel – close-up of the eastern cluster of field fortifications. Lower-right panel – plan of the statutory type of position of the Russian troops for one platoon of soldiers, according to the military manual of 1914. Graphic created by K. Przybysz-Malczewski, adapted from Modrakh 1914

due to post-depositional factors and the chronology of those features should not be referred to that period.

Among the features dated to First World War, the following functions can be distinguished: one fortified position for all around defence; one shooting post; two firing trenches; twenty front trench niches; two rear trench niches, twenty one-man prone foxholes and a shell crater left by a high-explosive shell explosion on the site of a feature of older chro-

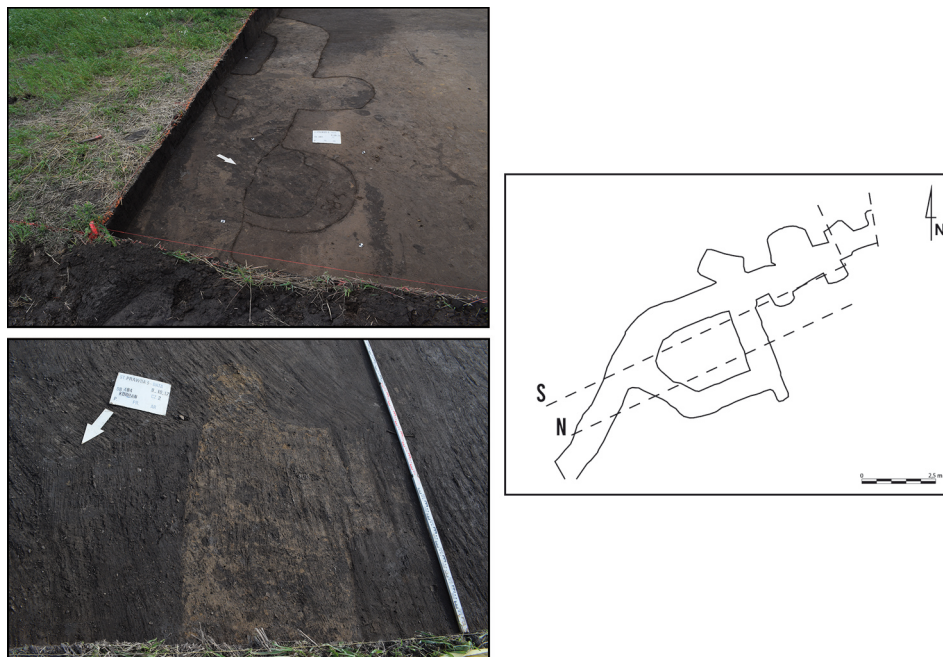


Fig. 4. Raciborowice-Prawda, Site 3. Fortified position for all round defence (Feature 484): upper-left panel – photo of the plan of the northern part, lower-left panel – photo of the plan of the southern part, right panel – drawing of the plan with the N and S cross-sections marked.
Graphic created by K. Przybysz-Malczewski

nology. Intentionally made features also comprised one position of the field fortifications, built simultaneously.

The fortified position for all round defence (Feature 484) is a continuation of Feature 379, which at the central point of the barrow surrounded its top (there is slight divergence on the southern side of the trench), leaving free space in the middle, it has a square-shaped section with dimensions of approximately 2.5×2.5 m. The trench has a continuation beyond the research area in the eastern direction and had two trench niches in its front slope. Before the commencement of the archaeological excavations, the barrow had been preserved to the height of 1.5 m and its diameter was 30 m.

The shooting post (Feature 510) had an irregular, elongated shape in plan. It was 5.9 m long. During the archaeological excavations, two cross-sections were made. The first one was located 0.8 m away from the southern edge of the feature. At that point, it was 1.12 m wide and 0.6 m deep. Its shape was four-sided, with a fire step located in the floor part on the eastern side, while in its western part, a provisional stove was built. The filling of the feature was diverse and composed of mixed layers of grey humus and beige loess (Fig. 6).

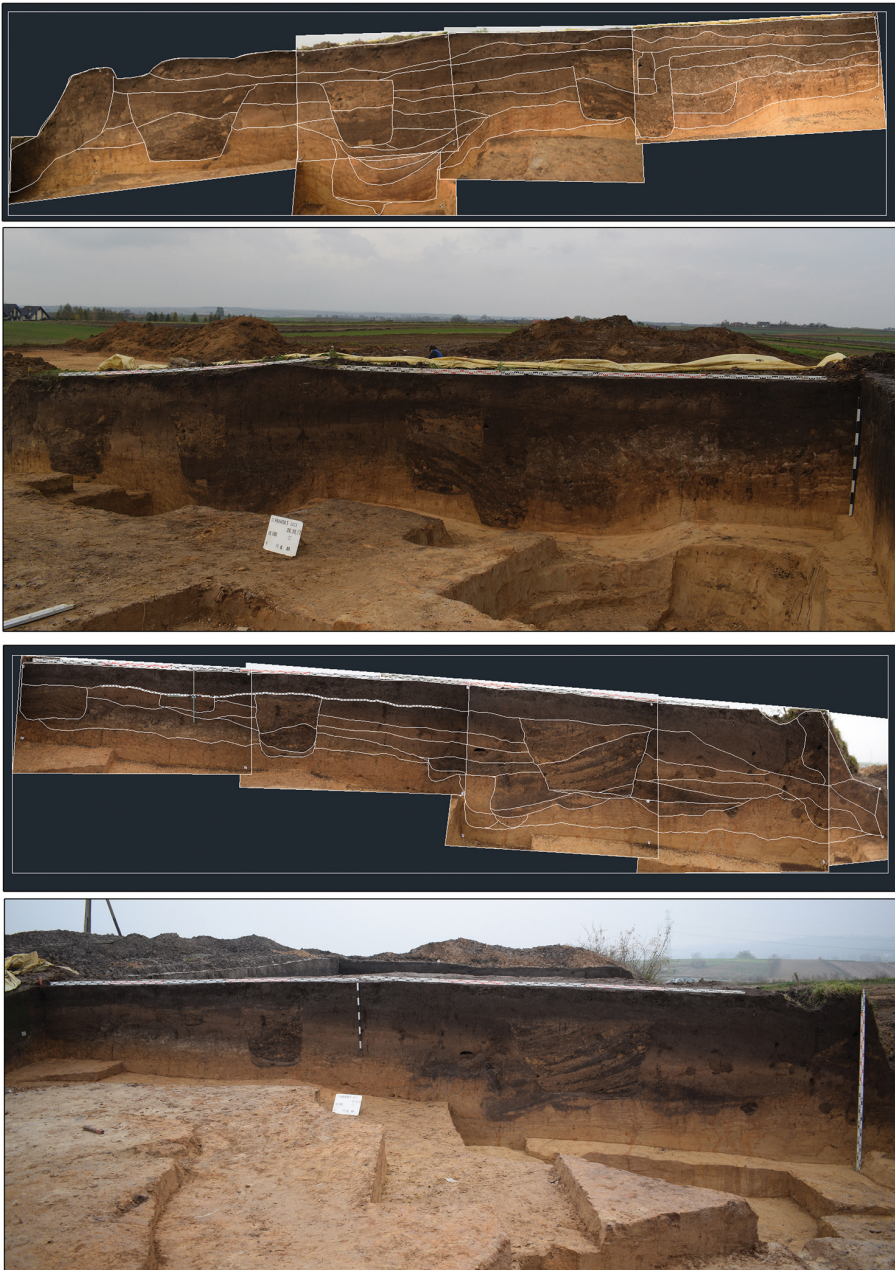


Fig. 5. Raciborowice-Prawda, Site 3. Fortified position for peripheral defence (Feature 484): two upper panels – orthophotomosaic with the outline of features and layers and a photo of the N cross-section, two lower panels – orthophotomosaic with the outline of features and layers and a photo of the S cross-section. Graphic created by K. Przybysz-Malczewski

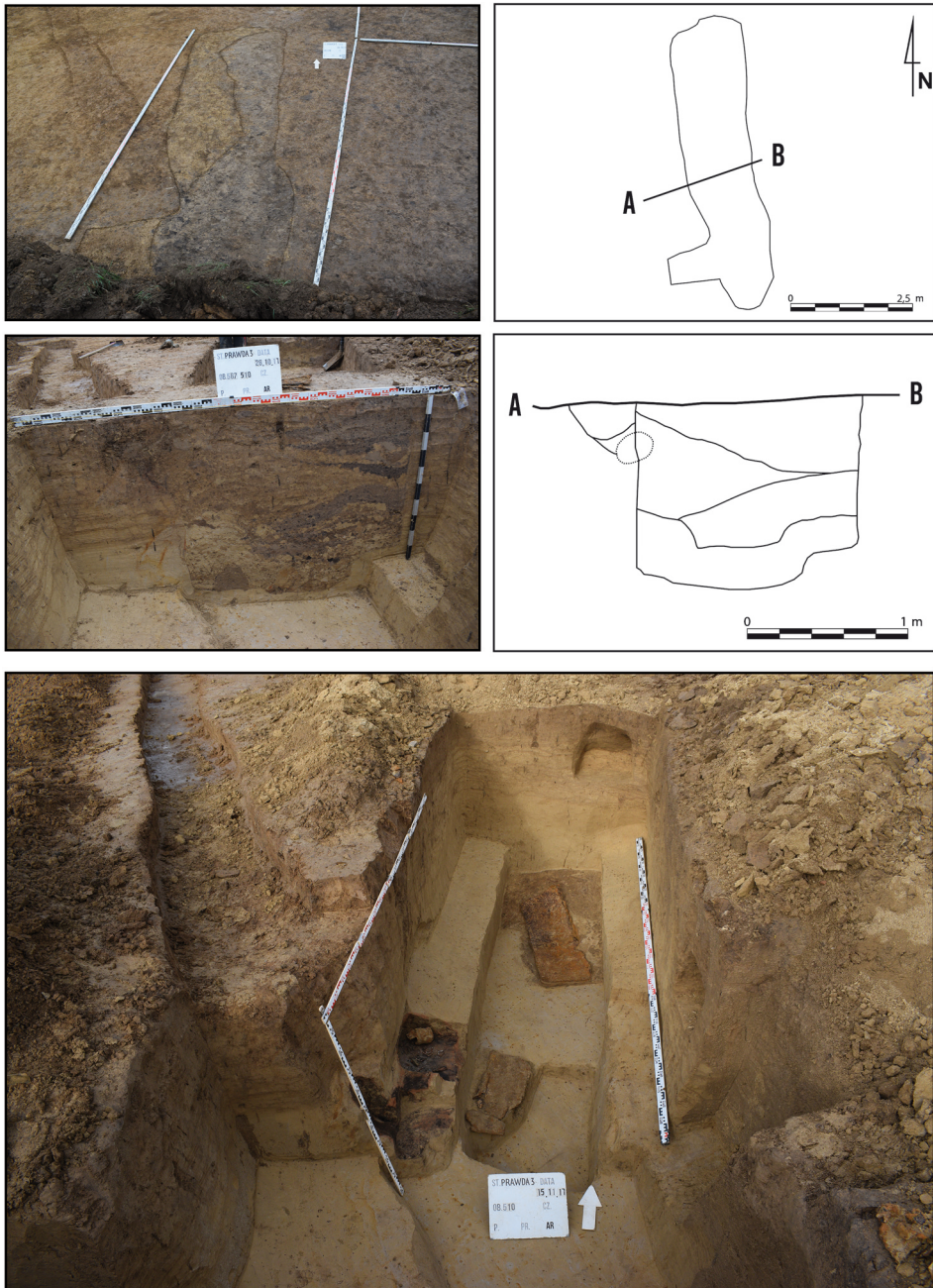


Fig. 6. Raciborowice-Prawda, Site 3. Shooting post (Feature 510): two upper panels – the photo and drawing of the plan, two middle panels – the photo and drawing of the cross-section, lower panel – the photo of the interior of the shooting post with the stove. Graphic created by K. Przybysz-Malczewski

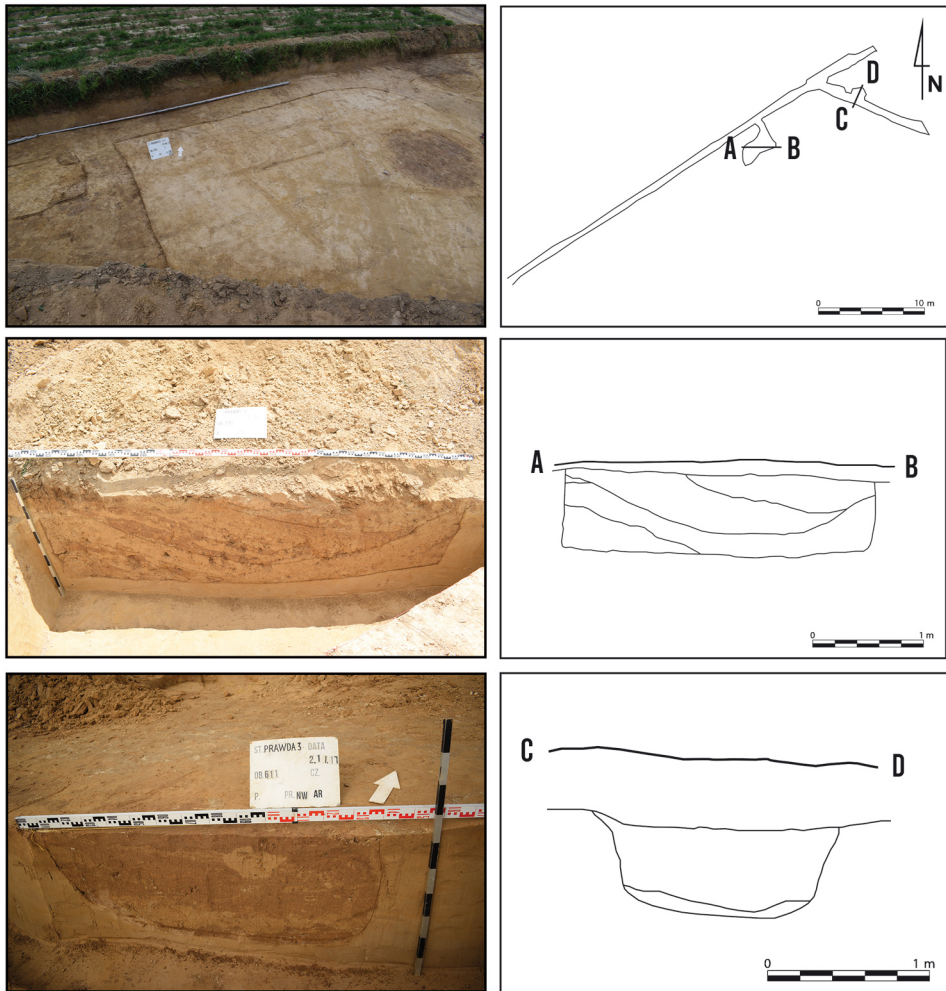


Fig. 7. Raciborowice-Prawda, Site 3. Firing trench (Feature 379): two upper panels – photo and drawing of plan with the cross-section lines A-B and C-D marked, two middle panels – photo and drawing of A-B cross-section, two lower panels – the photo and drawing of C-D cross-section.

Graphic created by K. Przybysz-Malczewski

Two firing trenches (Feature 379 and 509) were connected with each other. The firing trench in the section named Feature 509 was in the form of the interconnected curvilinear trench. A series of other features adjoined it – those were niches. The total length of the feature was 11.09 m. Four cross-sections were made. Profile no. 1 (N) was located 2.8 m away from the southern edge of the feature. The feature at that point seemed to be quadrilateral, expanding towards the top. The width of the top of the feature, located at the depth of 0.24 m below the humus surface, was 1.2 m, and the depth of the layers was 0.74 m.

Profile no. 2 (S) was created 1 m from the southern edge of the feature. At that point, it seemed to be quadrilateral, slightly widening towards the top on the west side, with a depth of 0.42 m. The upper part of the feature was 0.8 m wide. Profile no. 3 (N) was 3.4 m away from the southern edge of the feature. In that cross-section, it was connected at the eastern edge with Feature 571 (the rear niche of the trench), which disturbed the structure of its filling. Thus, the rear trench niches, unlike the front ones, were made after the trench had been built, as the final stage. In addition, the shape of the feature coincided with its form visible in other profiles. The width of the top of the feature was 0.64 m, and the depth of the layers was 0.4 m. At its eastern edge, the outline of Feature 714 (the front trench niche) was visible. The filling of the feature composed of grey and grey-beige humus, as well as beige loess. Feature 379 was characterised by analogous dimensions, indicating that it was the continuation of the same feature. It was extended in the southern direction with a short connecting trench, connected with the dugout. Its eastern wall was the extension of that connecting trench. The dugout had a rectangular shape in plan, with a longer wall oriented in accordance with the course of the firing trench. It was located 1.35 m away from this trench and it had in plan the dimensions of 3.65 × 1.85 m. Its walls were perpendicular to the bottom. Its upper part was at the depth of 0.4 to 0.18 m below the surface of the humus, and its depth from the bottom of the humus was 0.74 m (Fig. 7).

Twenty front-facing niches of the firing trench (Features 379 and 509) – Features 572-574, 593, 598-611, 613, 614 and 714, were very similar in size and shape. In plan, they had a shape similar to a rectangle, with a width ranging from 0.51 m to 1.42 m (with a mean of 0.89 m), length ranging from 0.6 m to 1.54 m (with a mean of 1.21 m) and depth ranging from 0.06 m to 0.62 m (with a mean of 0.43 m; Fig. 8). It should be pointed out that the front slopes of those niches coincides with the boundary of the agricultural fields at the time, so most likely those one-man prone foxholes were made with the use of a natural terrain obstacle, which was a boundary, in order to expand the position later on and implement a firing trench in that place (see Fig. 2).

The two rear niches of the firing trench (Features 402 and 571) are analogous to the front niches, but they were created at the rear slope of the firing trench. In plan, they had a shape similar to a rectangle, with a width ranging from 0.42 m to 0.7 m (with a mean of 0.56 m), and length ranging from 0.8 m to 0.94 m (with a mean of 0.87 m) and depth ranging from 0.44 m to 0.22 m (with a mean of 0.33 m; *cf.*, Fig. 9).

Twenty-one-man prone foxholes (Features 496-499, 501-503, 505, 506, 544-554) are the front-facing trench niches located on one axis without the construction of a firing trench, which was another unrealized stage of the works. In plan, they had a shape similar to a rectangle, with the width ranging from 0.59 m to 1.49 m (with a mean of 0.99 m), length ranging from 0.92 m to 1.57 m (with a mean of 1.28 m) and depth ranging from 0.06 m to 0.72 m (with a mean of 0.29 m; Fig. 10).

Intentionally made features represent the statutory type of field fortifications of the army of the Russian Empire (*cf.*, Niebylski *et al.* 2021, 113, 114, 121, 123). The niches

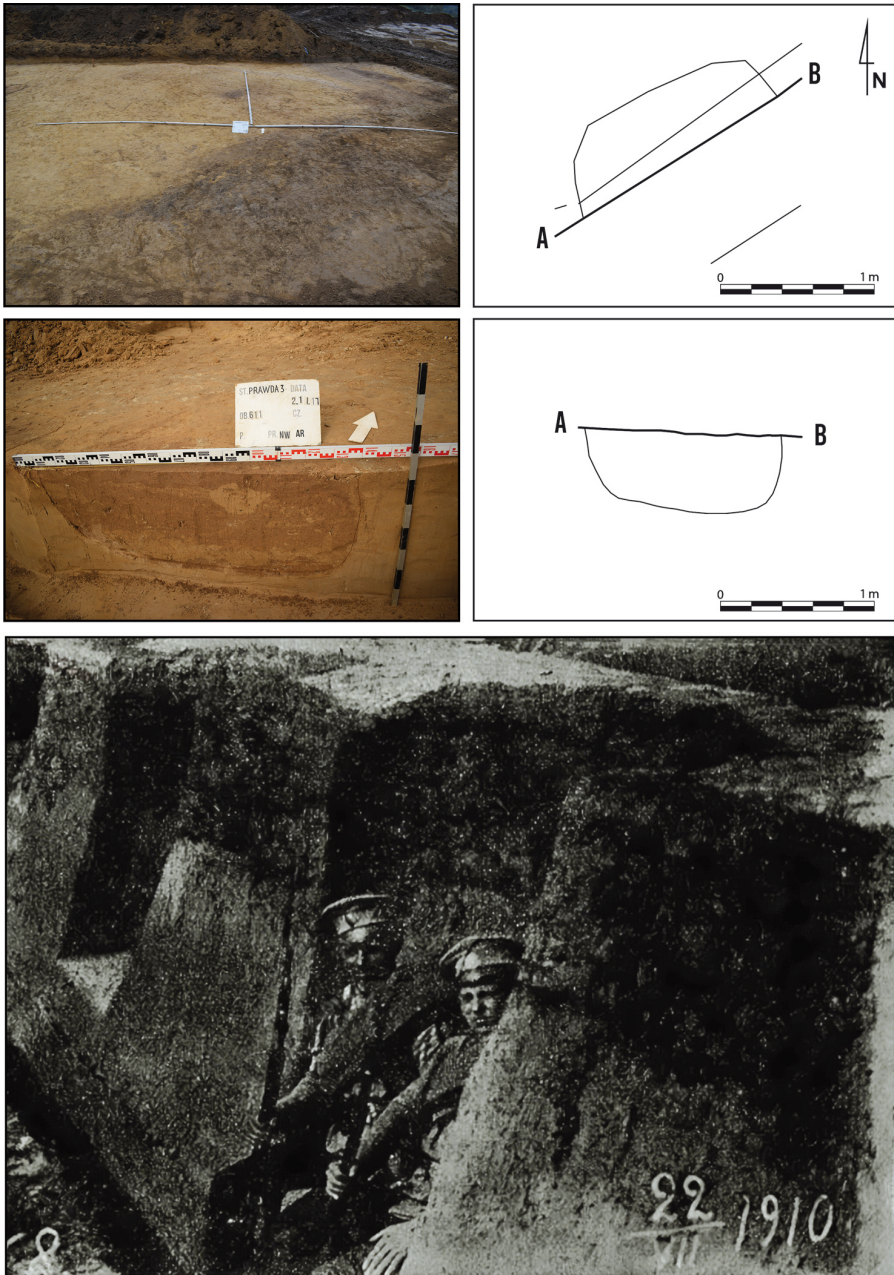


Fig. 8. Raciborowice-Prawda, Site 3. Front trench niche (Feature 611): two upper panels –photo and drawing of the plan, two middle panels – the photo and drawing of the cross section. Lower panel – the photo taken on 04.08.1910, showing the interior of a Russian firing trench with front trench niches. Graphic created by K. Przybysz-Malczewski, adapted from Modrakh 1914

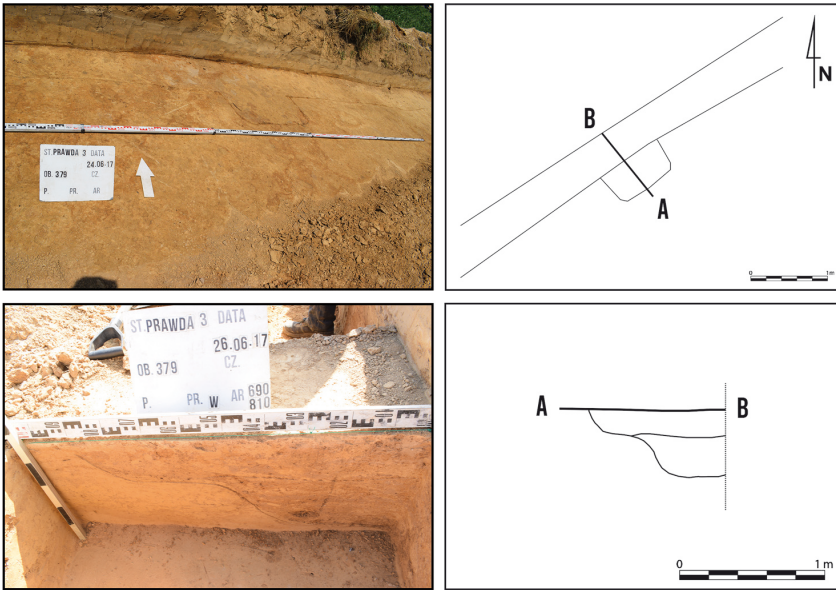


Fig. 9. Raciborowice-Prawda, Site 3. Rear trench niche (part of Feature 379): two upper panels – the photo and drawing of the plan, two lower panels – the photo and drawing of the cross-section. Graphic created by K. Przybysz-Malczewski

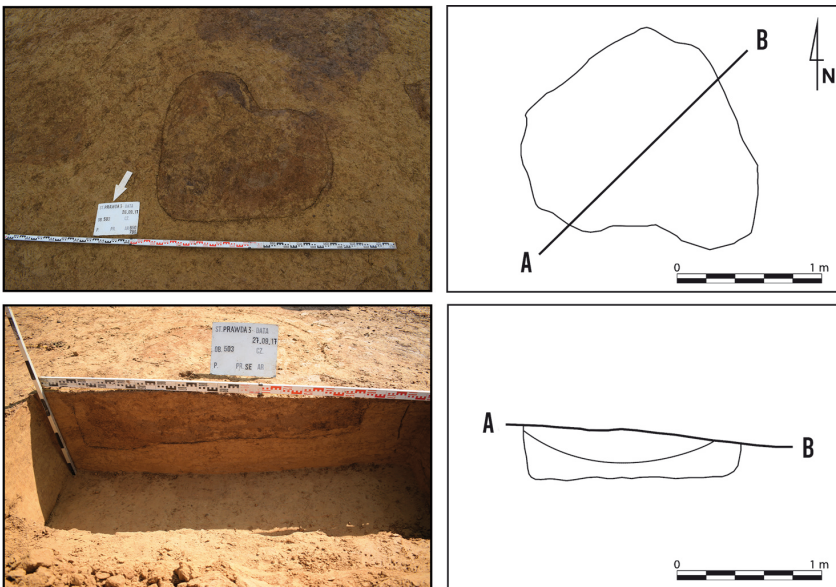


Fig. 10. Raciborowice-Prawda, Site 3. One-man prone foxhole (Feature 503): two upper panels – the photo and drawing of the plan, two lower panels – the photo and drawing of the cross-section. Graphic created by K. Przybysz-Malczewski

discovered at the site increased the horizontal firing angle from 60° (with the straight course of the firing trench) to 120° (Modrakh 1914). In addition, they allowed the soldiers to move freely through the firing trench, behind the soldiers occupying the positions in the niches (*cf.*, Fig. 8). It was a position fortifying the elevated area with a central point on the barrow and firing trench flanking it from the north-west, *i.e.*, protecting it from a possible enemy attack from the village of Prawda (see *Russische...* 1912, 91). It was only the shooting post (Feature 510) and the rear trench niches (Features 402 and 571) that were turned in the opposite direction in order to protect the position from the rear. Particularly noteworthy is the fact that the number of one-man prone foxholes in the unrealised section of the firing trench, is the same as the number of the front niches in the completed section, as well as being of similar size. Therefore, it was the second line, being the extension of the firing trench, that was probably planned for construction after the completion of the first section, which, however, did not happen.

As mentioned above, the discovered field fortifications represent the statutory form of position, which is confirmed in the Russian sapper manual (Modrakh 1914). According to the manual, a position with a length of 100 steps, with three dugouts and 25 front niches, was intended for one platoon of soldiers, *i.e.*, 50 soldiers (see Fig. 3). The analysed position has almost double number of niches and one-man prone foxholes and it is more than one and a half times longer, so it was intended for two platoons of soldiers, *i.e.*, 100 people. The eastern boundary of that position has not been found, so it could have been longer.

Examination of the discovered features

The use of barrows during First World War in order to build field fortifications is also known from other sites. A good example is Barrow 1 at the archaeological site Stryjów, Site 30, Krasnystaw district. The mound is dated to the early Bronze Age. It had a diameter of 10-12 m and a reconstructed height of 1.5-2 m. In the central part, a single-person shooting post with a fire step, associated with the battles of 1914–1915, was dug. What was discovered in it were a steel fitting of a wicker-type container for artillery shells and rifle cases of ammunition 7.92×57 mm. In addition, in the vicinity of the shooting post, the balls of shrapnel shells and cases of rifle ammunition were found (Budziszewski *et al.* 2016, 383, 384, ryc. 4, 386, ryc. 7, 400). As another example of the construction of field fortifications near the barrow in the form of trenches from the First World War, the parados of which were covered by the embankment, Feature 1 and 2, located in Guciów, Site 6, Zamość district, can be cited. The first of them has a diameter of 7.2 to 9.6 m, and its height is 0.95 m, and the trench is located on the north and northwest sides. The second barrow has a diameter of 2.8-5.3 m and a height of 0.2 m, and the trench surrounds it from the north and west (Iwański 2018, 41, 42). The relief of the terrain due to the presence of a barrow complex there was utilised in that case (*cf.*, Fig. 11).

Barrows were also used during Second World War to build field fortifications of strategic defence importance. An example of a barrow, around which a trench was built for the



Fig. 11. Examples of passive anti-personnel obstacles: upper panel – Kraków area. The photograph of an Austro-Hungarian anti-personnel obstacles made from barbed wire and plain wire in the foreground of the position from 1914. Note that the picture shows a roll of plain wire, analogous to the item discovered at the Raciborowice-Prawda, Site 3. Österreichische Nationalbibliothek, Wien, ref. no Pk 5090, 42, colourised by K. Przybysz-Malczewski, lower panel – Lytovezh, Volyn Oblast (Ukraine). The photograph of an Austro-Hungarian fortified position from First World War in an elevated area with the foreground secured with wire obstacles, analogous to the position discovered at the Raciborowice-Prawda, Site 3.

Private collection of J. M. Niebylski, colourised by K. Przybysz-Malczewski

purpose of all around defence is the 'Medisova humka', located upon Tisza in Žabalj, South Bačka district, in Serbia. This barrow has a diameter of 40 m, a height of 3.2 m and dated to 2800-2700 BC. In the northern part of the mound, a single-person brick-formed shooting post was additionally constructed, which constituted a convenient observation point. In its immediate neighbourhood, several other field works connected by a trench were made and they were surrounded by adjacent, currently eroded barrows. Those fortifications were constructed due to the organisation of defence by the Hungarian and German troops against the Red Army invading in October 1944, in order to prevent it from crossing the Tisza. In the vicinity of a single-person one-man foxhole, numerous Russian bullets of 7.62 × 54 mm R M1930 rifle ammunition were discovered, which confirms the active use of those positions in 1944 (Majstorović 2016, 396-398, 401, 402). This barrow, like the mound in Prawda, also has traces of artillery shelling in the form of craters after explosions of artillery high-explosive shells, which are also visible in its surroundings (Jarosz *et al.* 2021, 109, fig. 10, 110, fig. 11, 12, 111, 112, 132). Close to it, a German 8 cm mortar bomb was discovered, proving the firing of that area by the retreating troops.

An analogous line of fortifications, created in the form of one-man prone foxholes partially combined into a firing trench, where the foxholes constituted niches in the front slope of this trench, was discovered at Zalesie, Site 1, Kraków district, related to the Battle of Kraków (Niebylski *et al.* 2021, 114, fig. 7, 122, fig. 12). In this case, the field fortifications were built by the soldiers of the Russian army.

Feature 510, which is a forward shooting post, also has analogies with Zalesie, Site 1. These were two shooting posts with an elongated shape with a step, where in one of them there was also a hearth in the form of a provisional stove (Niebylski *et al.* 2021, 112, ryc. 5, 112, ryc. 6). Moreover, a brick stove was discovered in a feature located at Sadowie-Kielnik, Site 1, Kraków district, which was also part of the battlefield of the Battle of Kraków (Niebylski 2020a, 560, 562-564, 564, fig. 9, 10, 570, fig. 15, 572, 578).

ARTEFACTS

General characteristics

At the site, 50 artefacts in 711 fragments were discovered (Fig. 12, 13, 15-22). The items can be classified into five categories. These are as follows: 1. small arms ammunition (17 artefacts); 2. artillery ammunition (2 artefacts); 3. military equipment (11 artefacts); 4. personal items (4 artefacts), and 5. the equipment of field fortifications (16 artefacts). In some cases, artefacts can be divided into items related to a given party of the conflict, *i.e.*, the Austro-Hungarian Monarchy and Russian Empire, although there is a group of artefacts without such features that would be a basis for a determination of their provenance (Tables 1-3).

Table 1. Raciborowice-Prawda, Site 3.
List of artefacts of the provenance of the Austro-Hungarian Monarchy

Inv. no.	Feature	Item	Category	Figure
1	34	Can of ration	Military equipment	16: 1
2	40	Case of 7×57 mm M1893 ammunition	Small arms ammunition	12: 5
3	41	Case of 7×57 mm M1893 ammunition	Small arms ammunition	12: 6
4	379	Cartridge of 8×50 mm R M1893 ammunition	Small arms ammunition	12: 1
5	379	Cartridge of 7×57 mm R M1893 ammunition	Small arms ammunition	12: 2
6	379	Case of 7×57 mm M1893 ammunition	Small arms ammunition	12: 7
7	379	Cartridge charger clip of 7×57 mm M1893 ammunition	Small arms ammunition	12: 10
8	379	Cartridge charger clip of 7×57 mm M1893 ammunition	Small arms ammunition	12: 11
9	379	Cartridge charger clip of 7×57 mm M1893 ammunition	Small arms ammunition	12: 12
11	484	Can of ration	Military equipment	16: 2
13	484	Case of 7×57 mm M1893 ammunition	Small arms ammunition	12: 8
14	484	Case of 7×57 mm M1893 ammunition	Small arms ammunition	12: 9
16	484	Can of ration	Military equipment	16: 3
17	484	Charger clip with cartridges of 7×57 mm M1893 ammunition	Small arms ammunition	12: 17
18	484	Charger clip with cartridges of 7×57 mm M1893 ammunition	Small arms ammunition	12: 18
25	503	Can of ration	Military equipment	16: 4
27	509	Can of ration	Military equipment	16: 5
29	509	Tent peg of a M1893 tent sheet	Military equipment	17: 2
30	509	M1908 cartridge pouch for a carbine	Military equipment	17: 3
31-33	534 and in the barrow	12 cm M1861 high-explosive shell	Artillery ammunition	15: 1
35	In the barrow	Adjustment pin of the M1887 calfskin knapsack	Military equipment	17: 4
41	510	Can of ration	Military equipment	16: 6

Among these finds are 18 artefacts that testify to the presence of soldiers of the Austro-Hungarian army at the place of their discovery. These are elements of ammunition (charger clips with cartridges, cartridges, cases and charger clips) and equipment (pouch, peg of a tent, adjustment pin of a knapsack and cans) discovered in Features 34, 40, 41, 379, 484, 509, 510, and in the barrow.

The Russian army is associated with six items, confirming the presence of those soldiers at the place of their discovery (all of such provenance in the collection). They were found only in one location, Feature 503 (inv. nos 19-24). The ammunition had not been

Table 2. Raciborowice-Prawda, Site 3.
List of artefacts of the provenance of the Russian Empire

Inv. no.	Feature	Item	Category	Figure
19	503	M1909 cartridge pouch	Military equipment	17: 1
20	503	Cardboard box of charger clips with cartridges of 7.62 × 54 mm R M1908 ammunition	Small arms ammunition	13: 1
21	503	Cardboard box of charger clips with cartridges of 7.62 × 54 mm R M1908 ammunition	Small arms ammunition	13: 2
22	503	Cartridge charge clip of ammunition 7.62 × 54 mm R M1891 ammunition	Small arms ammunition	13: 5
23	503	Case of 7.62 × 54 mm R M1891 ammunition	Small arms ammunition	13: 3
24	503	Case of 7.62 × 54 mm R M1908 ammunition	Small arms ammunition	13: 4

Table 3. Raciborowice-Prawda, Site 3.
List of artefacts of undetermined provenance

Inv. no.	Feature	Item	Category	Figure
10	483	Tree planting bar	Field fortifications equipment	19: 1
12	484	Tablespoon	Personal items	18: 1
15	484	Shrapnel ball	Artillery ammunition	15: 2
26	503	Rim of a tobacco pipe lid	Personal items	18: 2
28	509	Bordeaux wine bootle with stopper	Personal items	18: 3
34	In the barrow	Pipe	Field fortifications equipment	21: 1
36	379	A roll of plain wire	Field fortifications equipment	22: 1
37	510	Scythe	Field fortifications equipment	19: 2
38	510	Barbed wire	Field fortifications equipment	21: 2
39	510	Charred wood	Field fortifications equipment	21: 3
40	510	Charred wood	Field fortifications equipment	21: 4
42	510	Bottle for high percentage alcohol	Field fortifications equipment	18: 4
43	510	Metal sheet	Field fortifications equipment	20: 1
44	510	Metal sheet	Field fortifications equipment	20: 2
45	510	Nail	Field fortifications equipment	21: 5
46	510	Nail	Field fortifications equipment	21: 6
47	510	Nail	Field fortifications equipment	21: 7
48	510	Nail	Field fortifications equipment	21: 8
49	510	Nail	Field fortifications equipment	21: 9
50	510	Nail	Field fortifications equipment	21: 10
51	510	Nail	Field fortifications equipment	21: 11
52	510	Cramp	Field fortifications equipment	21: 12

fired in any case; therefore, it only proves the presence of those soldiers, without getting into the fight or shooting at that place from a distance.

Among the artefacts, two items were made from leather. These are an Austro-Hungarian M1908 cavalry pouch with a steel stud and two brass rivets (inv. no. 30) and a Russian M1909 pouch with a preserved single brass stud (inv. no. 19). Two items were made from glass – a Bordeaux wine bottle with a wooden stopper stuck inside (inv. no. 28) and a bottle for vodka, as well as other high-percentage alcohol (inv. no. 42). Another artefact with preserved wood is a half of the Austro-Hungarian tent peg with steel tip fitting of a M1893 tent sheet (inv. no. 29), as well as two charred fragments of wood from the inside of the stove (inv. nos 39, 40). Cardboard has been preserved on two artefacts – in both cases, it is a package of Russian ammunition (inv. no. 20 and inv. no. 21) containing three charger clips with five cartridges in each of them (in the latter case, one item is missing due to post-depositional factors). Other artefacts in the collection were made solely from metal (brass, lead, lead-antimony alloy, steel, tin and tombac), and they are the following: inv. nos 1-3, 5-18, 22-27, 31, 34-38, 41, 43-52, and 32, 33 – parts of the item inv. no. 31.

The lacquer has been preserved on all discovered Austro-Hungarian cases and cartridges of 7 × 57 mm M1893 ammunition (inv. nos 2, 3, 5-9, 13, 14, 17, 18). Black lacquer filled the gaps around the primers in the heads of the cases to protect them from humidity and covered the cores of the bullets under the steel jackets). Moreover, red lacquer was preserved on the Austro-Hungarian artillery fuse M1901, covering two deepened markings in the form of letter 'a' on the upper screw (inv. no. 33, in the barrow).

Factory markings can be found only on the elements of small arms and artillery ammunition, which are all cases in the collection, fuse and bullets of the Austro-Hungarian production (both 8 × 50 mm R M1893 ammunition and 7 × 57 mm M1893 ammunition, an Austro-Hungarian type). On the fuse (inv. no. 33, in the barrow), the letters 'a' located on the opposite sides of the screw mean 'Aufschlag', that is 'impact' (a percussion fuse with direct action, detonating on contact with surface); what it indicates is that it was intended for a high-explosive shell without time delay (*Notes...* 1917, 7).

Dating based on the markings of the discovered artefacts is possible thanks to several items. It enables determining *terminus post quem* on the basis of headstamps of ammunition, the limit dates of which are 1906 (inv. no. 23) and 1914 (inv. nos 3, 6, 18, 21). Thus, on the basis of these signatures, it can be said that the battle took place in 1914 or later.

Small arms ammunition of the provenance of the Austro-Hungarian Monarchy

Twelve items were discovered at the site, which are elements of small arms ammunition of the provenance of the Austro-Hungarian Monarchy. These are charger clips, cases, cartridges, and charger clips with cartridges, which testify to the presence of soldiers of the Austro-Hungarian army in the places of their discovery. They represent 8 × 50 mm R M1893 ammunition and 7 × 57 mm M1893 ammunition (Fig. 12).

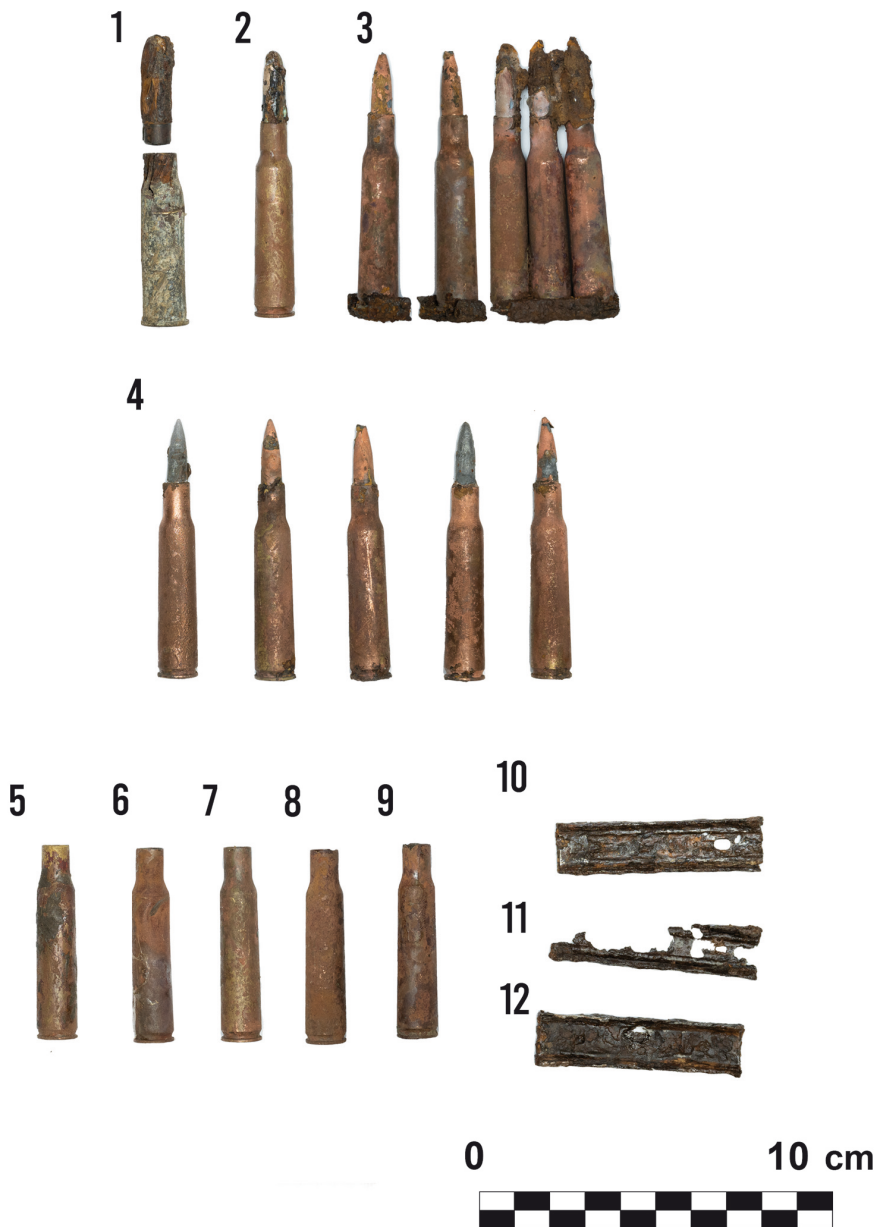


Fig. 12. Raciborowice-Prawda, Site 3. Small arms ammunition of the Austro-Hungarian Monarchy: 1 – cartridge of 8 × 50 mm R M1893 ammunition (inv. no. 4), 2 – cartridge of 7 × 57 mm M1893 ammunition, a German type (inv. no. 5), 3, 4 – charger clips with cartridges of 7 × 57 mm M1893 ammunition, an Austro-Hungarian type (inv. nos 17, 18), 5-9 – cases of 7 × 57 mm M1893 ammunition (inv. nos 2, 3, 6, 13, 14), 10-12 – cartridge charger clips of 7 × 57 mm M1893 ammunition (inv. nos 7-9).
Graphic created by K. Przybysz-Malczewski

The 8 × 50 mm R M1893 ammunition is represented by one artefact – a cartridge without traces of rust of the steel en bloc clip (inv. no. 4). It consists of a brass case with a brass primer and a round nose bullet with a core made of lead-antimony alloy in a steel full metal jacket. At the head (base) of the cartridge case, there is a headstamp in 4 × 90° system. These four fields are separated by sector lines, and the signatures are deepened. In the sector at 12 o'clock, there is the digit of the month 'VII', at 3 – the last two digits of the year '13', at 6 – the symbol of a two-head eagle, and at 9 – the first two digits of year '19'. It is also possible to read the markings located at the bottom of the core of the bullet, which is convex. In the upper row, it is a monogram <MF>, while below '8/3'. Thus, the case was produced in July 1913 by K.u.k. Munitionsfabrik in Wöllersdorf, Wiener Neustadt-Land district, whereas the bullet in August 1913, in the same factory (Mötz 1996, 386, 389, 425). Particularly noteworthy is the information about the incompatibility of markings of the bullet with the case headstamp (a discrepancy between the months); therefore, it is the first confirmation of the lack of the possibility of correlating precisely the fired bullets with the cases at archaeological sites (*cf.*, Niebylski *et al.* 2021, 147). This cartridge has no traces of corrosion products of the steel en bloc clip, *i.e.*, it was lost due to carrying a single cartridge in the pocket, or through unnecessary reloading of the loaded weapon, or intentional reloading, in order to unload the weapon, which would enable loading a five-round en bloc clip. That unnecessary reloading of weapon has been defined as the phenomenon of shooting uncertainty and in the case of the ammunition of this pattern at the Zalesie battlefield, it was frequent – it took place in the case of 13.51% of cartridges (Niebylski *et al.* 2021, 138, 142, 150, fig. 35). The cartridge in question has no traces resulting from the malfunctioning of a firearm, or ammunition malfunction, a dud, *i.e.*, the lack of ignition of the primer or propelling charge (no traces of impact-mark of the firing pin on the primer). The discussed ammunition was for a Mannlicher M1895 rifle (Žuk 2016, 58, 59), which was the statutory armament of an Austro-Hungarian army soldier, as well as its variants and belt-fed Schwarzlose M1907 and M1907/12 machine gun (*Instruktion...* 1913). Due to the single discovery, they should be related to a bolt action (repeating) rifle. The Mannlicher M1895 rifle was charged by ammunition made with smokeless powder; therefore, its tangent rear sight was scaled to the distance of 450 to 1800 m (with the minimum position at 375 and the maximum at 1950 m), with a barrel length of 76.5 cm and the initial velocity of $V_0 = 620$ m/s (Karczewski 1934, 162, 165, 174; Hýkel and Malimánek 1998, 253; Krčma *et al.* 2016, 194; Łukaszewski 2016, 109).

The discovered elements of 7 × 57 mm M1893 ammunition are represented by 11 artefacts. These are three steel cartridge five-round charger clips (inv. nos 7-9), five cases (inv. nos 2, 3, 6, 13, 14), one cartridge (inv. no. 5) and two charger clips with five cartridges in each of them (inv. nos 17, 18). Cartridges in charger clips consist of brass cases with brass primers and pointed-nose bullets with cores made of lead-antimony alloy in a steel full metal jacket. The charger clips are steel, with additional steel flat leaf springs. There were no cartridges in the three charger clips during their deposit, and all the cases had been

fired. The discovered single cartridge with no traces of the corrosion products of steel charger clip and therefore, it was lost due to carrying a single cartridge in the pocket, or unnecessary reloading of the loaded weapon. In the weapon that was supplied with that cartridge, there was no need to unload it to recharge the magazine. Furthermore, that cartridge has no traces of firearm malfunction, or the lack of ignition of the primer or propelling charge (no trace of impact of the firing-pin tip on the primer). It consists of a brass case with a brass primer and a round-nose bullet with a core made of lead-antimony alloy in a steel full metal jacket. At the gap around the primer in the head, all cases and cartridges were lacquered black to protect the cartridge from humidity, whereas the cartridge, as well as two charger clips with cartridges, has traces of lacquered the core of the bullet under a steel jacket. When comparing the number of three empty charger clips and two full ones with the number of five cases and one cartridge, it is possible to estimate the minimum amount of this type of ammunition originally located at the discovered position. Hence, its amount should be estimated at the minimum of 25 pieces (at least nine cases or cartridges are missing). The headstamp system of that kind of ammunition provided a system of deepened signatures in the system $2 \times 180^\circ$ without sectoral lines. At 12 o'clock, the manufacturer's symbol was placed, and at 6 o'clock, the full year of production was indicated. Among the discovered artefacts, three different variants of headstamps of that type of ammunition can be distinguished. The first of these is letter 'H' at 12 o'clock and date '1913' at 6 o'clock. Two cases have such markings (inv. nos 2, 14) and cartridges in one charger clip (inv. no. 17). In the case of cartridges from that charger clip, it was possible to read the marking at the bottom of the core of one of the bullets – it was a convex, stylised letter 'H'. The second variant of headstamps of this type of ammunition in the collection is letter 'H' at 12 o'clock and date '1914' at 6 o'clock. Such markings can be noted on three cases (inv. nos 3, 6, 13) and cartridges in one charger clip (inv. no. 18). The symbol 'H' indicates that the ammunition was manufactured at the Hirtenberger Patronen-, Zündhütchen- und Metallwarenfabrik A.G. factory in Hirtenberg, Baden district (Mötz 1996, 370, 389). The third variant of headstamps is represented by one cartridge (inv. no. 5). In this case, at 12 o'clock, there is the letter signature 'DWM', while at 6 o'clock, there is the annual date '1913'. The letter signature 'DWM' indicates production in the German Empire at the Deutsche Waffen- und Munitionsfabriken factory in Karlsruhe, Karlsruhe district (Ciemński 2014, 96). The bottom of the bullet of this cartridge has a cone-shaped cavity and it is not marked. The German Empire exported the weapon supplied with that ammunition and the ammunition itself, but they did not have it in service in their army. It is highly likely that this finding testifies to the purchase of this kind of ammunition by the Austro-Hungarian Monarchy. The German ammunition is distinguished morphometrically from the Austro-Hungarian one by the fact that in the former case, the bullets were round-nosed, and in the latter they were pointed-nosed.

The ammunition in question was developed in 1892 by Paul Mauser, at the request of the Kingdom of Spain (Žuk 2016, 71). That cartridge was structurally based on the $7.92 \times$

57 mm cartridge developed in the German Empire, but it had a reduced diameter to 7 mm (Labbett 1982, 30, 31; Woodard 2011, 78; Kisak 2016, 323; Bussard 2017, 657). It was intended for export to such countries as Chile, Colombia, Mexico, Spain and Venezuela (Cie-miński 2014, 109). Other producers of that ammunition in the Austro-Hungarian Monarchy were as follows: Manfred Weiss, Budapest-Csepel, Budapest district (symbol 'W') and Georg Roth Aktiengesellschaft, Vienna III, Vienna district (symbol <GR>; Ciemiński 2014, 112, 113). It was produced in relation to the export of the weapon that it supplied – the Steyr M1912 rifle (Spanish name: Fusil Modelo 1912), produced at the Austro-Hungarian Österreichische Waffenfabriks-Gesellschaft in Steyr, Steyr district (SWG). That weapon was based on the construction of the German Mauser M1898 rifle (Gewehr 98) and its recipients were Chile, Colombia and Mexico (Haładaj and Rozdżestwieński 2010, 31; Żuk 2016, 61, 79). Before the outbreak of First World War, the Mexican authorities had a problem with solvency for orders due to the overthrowing of President Portifiro Díaz, followed by the policy of the government of Francisco I Madero (1911–1913) and several changes of the authorities after him (four authorities after him in 1913–1914; Mirosz 2007, 223, 224; Jung 2017, 34, 44). After the outbreak of the War, the discussed weapon and ammunition remained unshipped in the Austro-Hungarian warehouses and at the time of mobilisation, it was included in the armament as Infanterie Repetiergewehr M1914 (*Merkblätter...* 1918, 13). Some of the reserve Austro-Hungarian units were armed with this weapon. In that manner, the weapon and ammunition in question were included in the armament of the Landsturm, constituting the crew of the Kraków Fortress that joined the fight in that section of the front on 23 November 1914, supporting the 39th Honvéd Infantry Division, and then were fighting in the foreground of the Kraków Fortress until December 1914 (*Instruktion...* 1916; Mötz 1996, 265; Niebylski 2020a, 582). That rifle and type of ammunition were discovered at Sadowie-Kielnik, Site 1 and the ammunition again was found at Wola Więclawska, Site 10, Kraków district, which was the battlefield of the Battle of Kraków (Niebylski 2020a, 570, fig. 15, 571, 572, 574, fig. 18, 577, 582; Niebylski and Czarnowicz 2022, 86, 94, 95, ryc. 15, 96, 102-104).

Small arms ammunition of the provenance of the Russian Empire

The Russian ammunition was discovered only in one feature – 503. This collection consists of a steel 7.62 × 54 mm R M1891 charger clip (inv. no. 22), a 7.62 × 54 mm R M1891 case (inv. no. 23), a 7.62 × 54 mm R M1908 case (inv. no. 24) and a package of three charger clips with five 7.62 × 54 mm R M1908 cartridges (inv. no. 20) and a second package with three charger clips with five 7.62 × 54 mm R M1908 cartridges, in one charger clip, one cartridge is missing due to post-depositional factors (inv. no. 21). Those two packages constituted the contents of the Russian M1909 pouch discovered there (Fig. 13). None of the ammunition was fired. The discovered cases were made from brass, with brass primers placed in recesses in the heads. These cartridges have pointed-nosed bullets with lead-

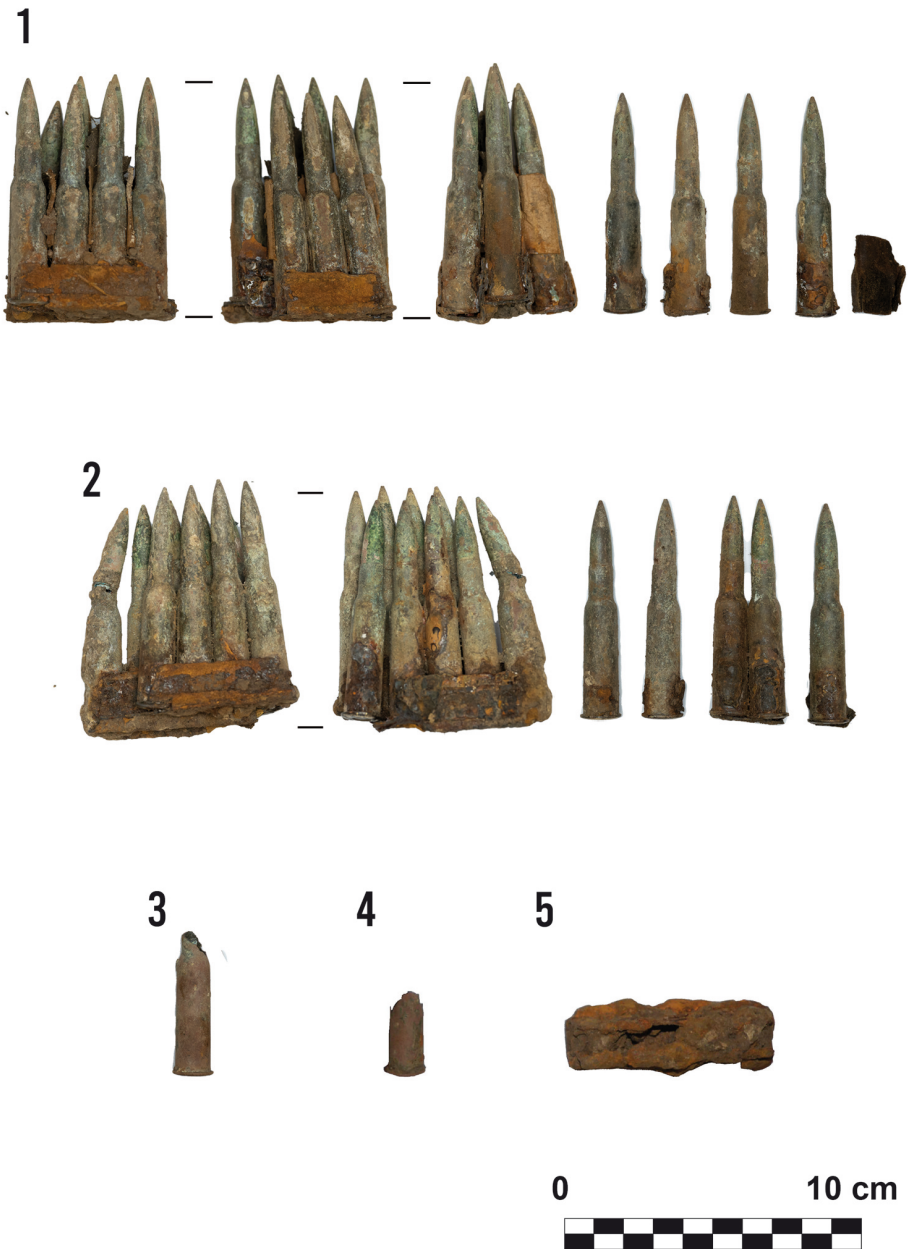


Fig. 13. Raciborowice-Prawda, Site 3. Small arms ammunition of the Russian Empire: 1, 2 – the contents of the M1909 cartridge pouch (inv. no. 19) – cardboard boxes of charger clips with cartridges of 7.62×54 mm R M1908 ammunition (inv. nos 20, 21), 3 – case of 7.62×54 mm R M1891 ammunition (inv. no. 23), 4 – case of 7.62×54 mm R M1908 ammunition (inv. no. 24), 5 – cartridge charge clip of 7.62×54 mm R M1891 ammunition (inv. no 22). Graphic created by K. Przybysz-Malczewski

antimony alloy cores and tombac full metal jackets. On one 7.62 × 54 mm R M1891 case (inv. no. 23), which was not fired, there are traces on its neck, indicating the deliberate breaking apart of the bullet before its deposition (*cf.*, Niebylski 2020a, 580, Fig. 21, 581; Niebylski and Czarnowicz 2022, 95, fig. 15, 107, fig. 28). No propellant was found nearby. This had most likely been done in order to obtain the combustible material (propelling charge) inside by a soldier to start a fire. There are no traces of the charger clip's corrosion products on the case. Its neck has been crushed by post-depositional conditions and hence, it is not possible to determine whether the bullet clamp was two- or three-point. The 7.62 × 54 mm R M1908 ammunition in each case has an all around clamp. The second case (inv. no. 24) has no traces of the charger clip's corrosion products either and it has neither a preserved body part nor a neck; therefore, it is impossible to determine whether it had been broken apart as well.

The Russian ammunition, due to the alloy used, has survived in a much worse condition than the Austro-Hungarian items. In the group of these two types of ammunition, all cases have convex headstamps on the heads and they are in 2 × 180° and 4 × 90° systems. The former is represented by three artefacts, including two pieces from a package of cartridges from the pouch (inv. no. 21). At 12 o'clock, they have two digits '10' standing for 1910, and at 6 o'clock, they have digit 'I', for the first trimester of the year (January–April). That ammunition was produced by an undetermined factory, most likely from pre-prepared cases without headstamps. The third cartridge, coming from the same package, at 12 o'clock has the mark 'II', and at 6 o'clock – '914' (inv. no. 21). What this means is that the cartridge was manufactured in 1914 in the factory Luganskiy Patronnyi Zavod in Luhansk, Luhansk district. The latter system is represented by three variants of marking. The first of these is (12)-'06' (3)-'T' (6)-'II' (9)-'II' (inv. no. 23) and it means that the cartridge was made in September–December 1906 at the Sankt-Peterburgskiy Patronnyi Zavod plant in Saint Petersburg, Saint Petersburg district, to which the brass sheet for cases was delivered from the Torgovyi Dom F. G. fon Gillenshmidta plant in Tula, Tula district. Another variant is the case (inv. no. 23) with the headstamp (12)-'10' (3)-'T' (6)-'I' (9)-'II', which means that it was produced in January–April 1910 at the Luganskiy Patronnyi Zavod factory in Luhansk and the brass sheet for the cases was delivered from the aforementioned plant in Tula. The third variant, which is represented by three pieces (one with inv. no. 20 and two with inv. no. 21), is a headstamp (12)-'11' (3)-'Φ' (6)-'II' (9)-'II', which means that that ammunition was produced in May–August 1911 at the Sankt-Peterburgskiy Patronnyi Zavod plant in Saint Petersburg, and the supplier of the brass sheet for the cases was the Zavod Obschestva Franko-russkikh Zavodov in Saint Petersburg (Dąbrowski 2009, 18; Niebylski 2020a, 575–577). Thus, a package with three charger clips with cartridges (inv. no. 21) constitutes the confirmation that within one clip, it was feasible to have cartridges with more than one variant of headstamps (see Fig. 14).

That ammunition was used in the bolt action rifle Mosin M1891 (modernised) and its variants, as well as the belt-fed machine gun Maxim M1910 (Ostrowski 2018, 103–105,

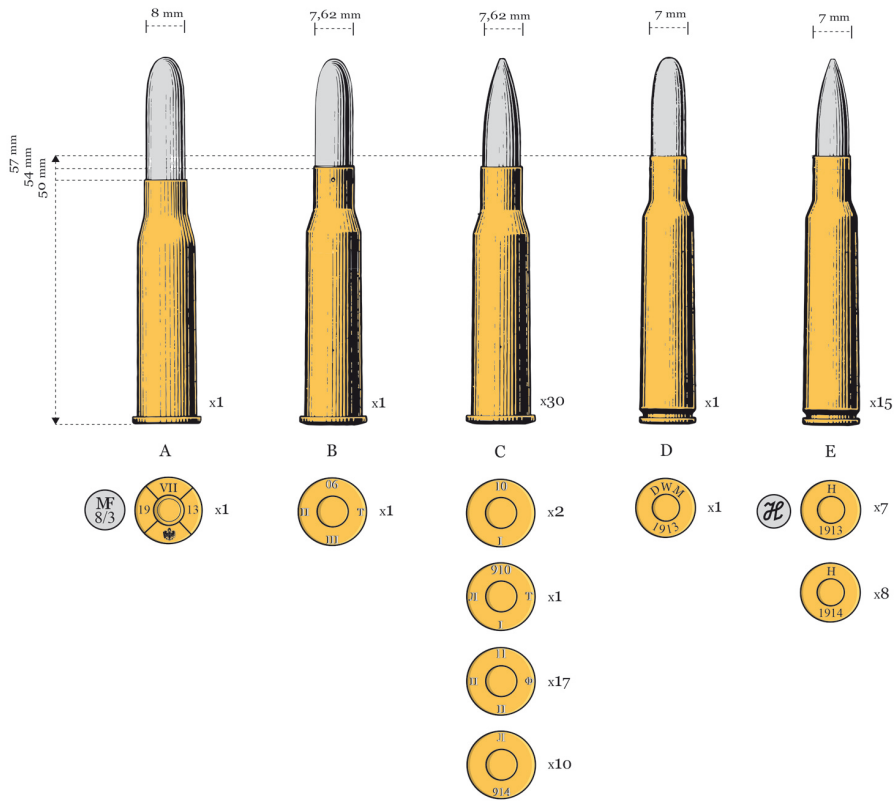


Fig. 14. Raciborowice-Prawda, Site 3.

The variety of types and variants of headstamps of the discovered small arms ammunition: A – 8 × 50 mm R M1893 (Austro-Hungarian Monarchy), B – 7.62 × 54 mm R M1891 (Russian Empire), C – 7.62 × 54 mm R M1908 (Russian Empire), D – 7 × 57 mm M1893 (German Empire), E – 7 × 57 mm M1893 (Austro-Hungarian Monarchy). Designed by J. M. Nieblyski, drawn by K. Przybysz-Malczewski

108). The Mosin M1891 rifle (modernised) had an effective firing range over a distance of 420 m, and its tangent rear sight was scaled to the distance of 284.48 to 2275.84 m, with a barrel length of 80.1 cm and the initial velocity of $V_0 = 880$ m/s (Wrobel 1999, 65, 347; Chumak 2007, 19; Żuk 2016, 92).

Artillery ammunition of the provenance of the Austro-Hungarian Monarchy

At the site, 21 fragments of one artillery shell (projectile) – a high-explosive 12 cm M1861 shell were discovered in three clusters: of four fragments (inv. no. 31), four fragments (inv. no. 32) and 13 fragments (inv. no. 33). The body of the projectile is made from steel, and on the surface, there is a lead rotating band, *i.e.*, jacket with bulges (Fig. 15: 1A-E; *Zusam-*

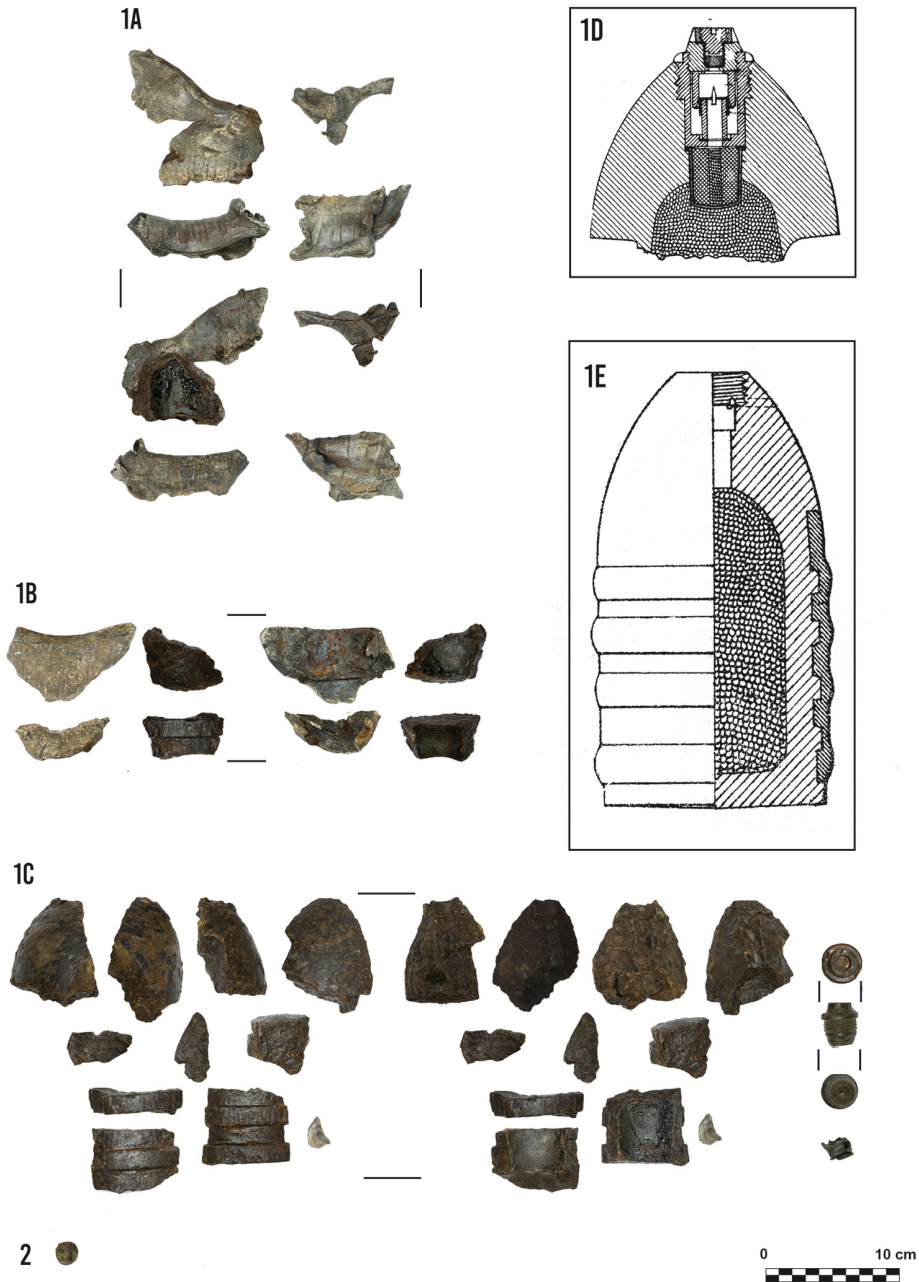


Fig. 15. Raciborowice-Prawda, Site 3. Artillery ammunition: 1A-C – a 12 cm M1861 Austro-Hungarian high-explosive shell (inv. nos 31-33), 1D, E – technical drawings of an 12 cm M1861 high-explosive shell, 2 – shrapnel ball (inv. no. 15). Graphic created by K. Przybysz-Malczewski, adapted from *Zusammenstellung... 1913* and *Notes... 1917*

menstellung... 1913, 71). In the cluster of 13 fragments (inv. no. 33, found in the barrow), there is a complete ogive part of the projectile (six fragments) with a fuse cavity for a fuse and a side in the ogive slot for its safety pin. This is an indicator of production by the German Empire, at the request of the Austro-Hungarian Monarchy. These fragments have the following specification: length 8 cm and 495 g; 9 cm and 630 g; 9.5 cm and 644 g; 8 cm and 694 g; 5 cm and 172 g and 5 cm and 45 g. What is more, the cluster encompassed four fragments of the body, including three with thickenings (lands) in the shape of a ring for embedding the rotating band, with the following dimensions: 7 cm and 253 g (lower land); 7 cm and 369 g (two lower lands), and 7.5 cm and 131 g. In addition, this group of artefacts in question involves 1 fragment with an upper land and cannellure (groove) for a rotating band above, and one fragment of the rotating band with a length of 2.5 cm and a weight of 7 g. What has also been discovered are a brass M1901 inertial fuse of Austro-Hungarian production, with no preserved central screw, with two 'a' markings ('Aufschlag') lacquered red, located on both sides of the upper screw, weighing 88 g, and a detonator cup of this fuse, weighing 3 g (*Notes...* 1918, 16, 17). Thus, the total weight of the fragments of this cluster is 3.531 kg. The second cluster of fragments, also coming from the barrow (inv. no. 32) consists of four fragments: two pieces of a projectile body (length 7 cm and weight 159 g; 6.5 cm and 166 g), including one with a land; two fragments of a rotating band (7.5 cm and 125 g; 10.5 cm and 371 g, with the upper edge of the rotating band including the groove and the upper land), both with a narrowing for the projectile body land. On the fragments of the rotating band, there is a trace of the rifled bore of the barrel and the width of the land is 1 cm and the width of the groove is 0.6 cm. Thus, the weight of the fragments from this cluster is 0.821 kg. The third cluster of fragments (inv. no. 31) was discovered in Feature 534. This was in fact a niche grave of the burial of two individuals from the population of the Corded Ware culture. The four fragments of shell that were found intrusive in its fill consisted of one fragment of a projectile body with land (length 6.5 cm), combined with a rotating band (length 15 cm); and three fragments of a rotating band with lengths of 11 cm (396 g), 8.5 cm (106 g) and 10.5 cm (427 g). There is a trace of the rifled bore of the barrel, with the same dimensions as in the second cluster – the width of the land is 1 cm, and the width of the groove is 0.6 cm. The weight of the fragments from this cluster is 0.929 kg. The total weight of the fragments of this projectile from the entire site (from the three clusters, located at a short distance from each other) is 5.281 kg. That projectile, without explosive material (0.52 kg), weighed 13.51 kg, so about 39.1% of its fragments have been recovered (*Schießtafeln...* 1908, 22; Chrzanowski 2008, 28).

That shell charged a Wahrendorff M1861 12 cm (twelve-pounder) battery gun with 24 twists of micro-rifled bore of the barrel with a rotation to the right (Benda 1919, 131, 132, 136, 137; Kerchnawe 1935, 113, 114; Ortner 2007, 102-107). That obsolete model was still included in the armament of the forts of the Kraków Fortress. It was a casemate gun with a wooden depression carriage to be placed in scarp caponiers, although it could also be located, for instance, on a counterscarp battery to cover the ditch, or on a rampart. It was

2.77 m long and its weight was 1490 kg. The range of that gun for a canister was 500 m, for a shrapnel shell 2800 m, and for a high-explosive shell 5500 m. That type of a gun was modernised in 1895, obtaining the designation 'M1861/95'. The wooden carriage was adapted to being placed in casemates as their main weapon. The modernisation increased the distance, when firing high-explosive shells, to 5800 m, while the distances of firing canisters and shrapnel shells did not change (*Artillerieunterricht...* 1906, 133, 134; Kurek and Kurek 2002, 55, 56, 79, 87, 89). Close to the site, among the forts taking part in the Battle of Kraków, only Fort no. 49 'Krzesławice' had those guns in its armament, there were four of them. It shelled the Russian positions between 18 and 20 November, as well as on 30 November 1914 (Brzoskwinia 1994, 1). This Fort is located 3.80 km away from the barrow in question, which is located in the north-northwest direction. The projectile was manufactured in the German Empire, then used with a newly designed M1901 Austro-Hungarian fuse (Chrzanowski 2008, 25). The new projectiles of Austro-Hungarian production were devoid of a slot for the safety pin for the German M1861 percussion fuse. That type of gun, on the fortress carriage, was operated by five soldiers. The 12 cm M1861/95 sights had an elevation markings every 100 m and they were calibrated to 3000 m, whereas the maximum distance (range) during the test shots was determined to be 5500 m. The dimensions of the explosion crater ranged from 0.21 m to 0.79 m in depth and the diameter from 0.50 m to 1.42 m, while the tightness of the shot grouping from a distance of 3000 m was 36 m in length, 4.14 in width and 9.03 m in height (taking into account the 50% Circular Error Probable (*Zusammenstellung...* 1913, 24; Chrzanowski 2008, 16, 17, 19, 37). Thus, the site was within the range of Fort no. 49 'Krzesławice', and the projectile was fired from it.

Artillery ammunition of undetermined provenance

The spherical lead shrapnel ball from the explosion of a shrapnel shell discovered in Feature 484 (inv. no. 15) does not have any features that would allow its origins to be determined (Fig. 15: 2). It weighs 14.82 g, and on its surface there are four dents from collisions with other shrapnel balls. Its diameter is within the range of 1.4-1.5 cm. Most likely, it comes from a shrapnel shell with a calibre of more than 10 cm.

Military equipment with the provenance of the Austro-Hungarian Monarchy

At the site, six steel, statutory food rations of the Austro-Hungarian army were discovered, being cans of rations, including two completely preserved (inv. nos 1, 41), the first of which with a separately preserved, half-bent end of the can, opened with a can opener (Fig. 16; Birnstein 1911, 97; Schmid 1914, 392; *cf.*, Mroczkowski and Kawa 2020, 111-113). It was 11 cm high and it had a diameter of 10.5 cm. The second one, discovered in the chamber of a provisional stove, had an end opened with a can opener and bent upwards as well, leaving



Fig. 16. Raciborowice-Prawda, Site 3. Military equipment of the Austro-Hungarian Monarchy: 1-6 – cans of rations (inv. nos 1, 11, 16, 25, 27, 41). Graphic created by K. Przybysz-Malczewski

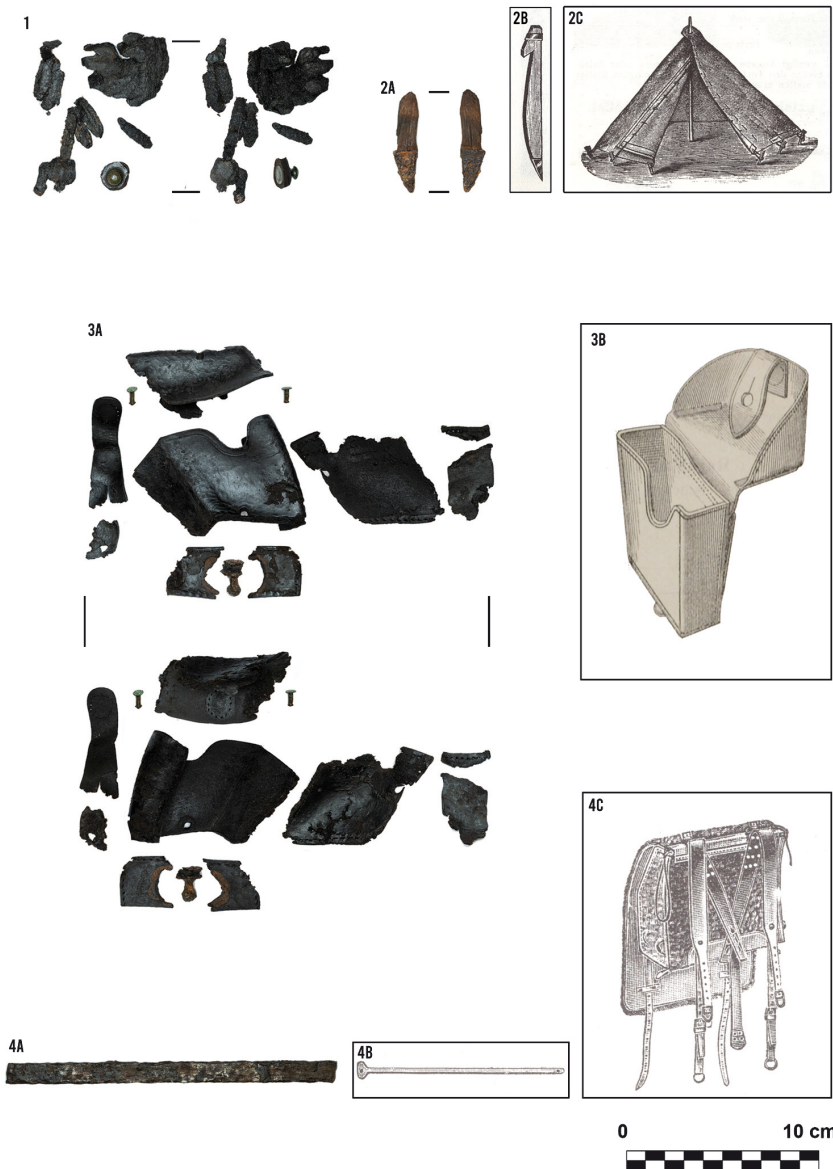


Fig. 17. Raciborowice-Prawda, Site 3. Military equipment of the Russian Empire and the Austro-Hungarian Monarchy: 1 – a Russian M1909 cartridge pouch (inv. no. 19), 2A – an Austro-Hungarian tent peg of a M1893 tent sheet (inv. no. 29), 2B, C – the technical drawings of the tent peg and the M1893 tent sheet, 3A – an Austro-Hungarian M1908 cartridge pouch for the carbine (inv. no. 30), 3B – technical drawing of the M1908 cartridge pouch for the carbine, 4A – an Austro-Hungarian adjustment pin of the M1887 calfskin knapsack for the infantry (inv. no. 35), 4B, C – technical drawings of the adjustment pin and the M1887 calfskin knapsack for the infantry. Graphic created by K. Przybysz-Malczewski, adapted from *Adjustierungsvorschrift...* 1911 and Schall 1915

the uncut section of the length 3.5 cm. It has a height of 7.8 cm and a diameter of 7.7 cm. It is burnt and it has a bottom warped outside from cooking, protruding beyond its rim by 0.5 cm, making it now impossible place it flat. The third example consisted of 35 fragments of one can (inv. no. 11), which included a completely preserved bottom with a connection to the wall; five fragments of the upper rim with traces of opening the end with a can opener; seven fragments of the end and 22 fragments of the wall. The fourth find (inv. no. 16) is a fragment of the base of a can with a length of 2.4 cm and a width of 2 cm. The fifth example contained 25 fragments of a can (inv. no. 27), with seven fragments of the bottom, including one fragment of the base with a connection to the wall, and six others with lengths not exceeding 2 cm; 13 fragments of the wall, including one with the sheet connection; five fragments of the upper rim with traces of opening the end with a knife, including one fragment with the end bent outwards. The sixth example consisted of two small fragments of wall with the length of 3.5 cm and 5.3 cm.

Another artefact that constitutes the equipment of an Austro-Hungarian soldier is a fragment of the tent peg of a M1893 tent sheet (inv. no. 29; Schall 1915, 270; Ortner and Hinterstoisser 2013, 143). It was made from wood (the preserved length is 4 cm outside the fitting) and steel (the preserved complete lower, tip fitting). The tip fitting has a length of 2.8 cm, the width of 1.5 cm and a thickness of 1 cm. Its upper fitting has not been preserved (Fig. 17: 2A-C).

Moreover, the Austro-Hungarian M1908 cartridge pouch for a carbine (inv. no. 30) was discovered (*Adjustierungsvorschrift...* 1910, 88; *Adjustierungsvorschrift...* 1911, 91; Schall 1915, 305). It is a completely preserved leather pouch without a preserved buckle with no prong for attaching the carrying straps of the knapsack. What has been preserved are two rear brass rivets and a steel stud for fastening the lid strap. Among the preserved fragments of leather, one can distinguish a complete lid, a lid strap in two fragments, the bottom in two fragments, the rear wall and the front with the sides of the pouch, as well as a carrying strap in two fragments for attaching to the belt in two fragments (Fig. 17: 3A, B). That (single-compartment) pouch was sufficient to contain a cardboard box for two *en bloc* clips of five cartridges of 8 × 50 mm R M1893 ammunition in each of them. The fact that it was not two-chambered was justified by its designation for the cavalry and gendarmerie units armed with Mannlicher M1895 carbines. After the leather had been formed and before it was handed over to a soldier, a block of wood, profiled in the shape of two *en bloc* clips with cartridges, was placed inside (Ortner and Hinterstoisser 2013, 52, 58).

The last artefact of Austro-Hungarian provenance is the adjustment pin of the M1887 calfskin knapsack found in the barrow (inv. no. 35; Schall 1915, 304; Ortner and Hinterstoisser 2013, 92, 93). It was damaged before its deposition. It is a flat bar with both ends broken and a preserved partial length of 17 cm, with a width of 1 cm and a thickness of 0.3 cm. It was inserted from the side into the upper part of the knapsack and into the carrying straps and fastened at the ends with straps, in order to limit its deformation and allow adjustment of the length of the carrying straps (Fig. 17: 4A-C).

Military equipment of the provenance of the Russian Empire

Among the discovered artefacts, there were parts of a leather Russian M1909 pouch (inv. no. 19), inside which there were 30 cartridges of 7.62 × 54 mm R M1908 ammunition, one piece is missing due to post-deposition factors (inv. nos 20 and 21). In each of the two compartments, there were three charger clips with five cartridges (*Sbornik...* 1915, 396; Bushmakov 2017, 502; Niebylski *et al.* 2021, 127, 129, fig. 18). The pouch was discovered in six fragments and it is not complete. It consists of five leather fragments with the following lengths: 6 cm; 6 cm; 5 cm; 3.5 cm and 3 cm, as well as one fragment with the preserved brass rivet-back stud, 0.8 cm in diameter, 0.8 cm in length and 1.1 cm in the diameter of the brass washer, located on the other side of the wall of the pouch (Fig. 17: 1). The second stud has not been preserved – it was originally placed on the opposite, side wall. Both compartments of the pouch were closed with a lid that extends over both compartments, from which two leather straps along the side walls with holes for studs were led. Russian soldiers of this period were equipped with two such pouches fastened to the main belt, slid onto the belt either side of the buckle.

Personal items

A tin tablespoon with steel core (inv. no. 12) was discovered in Feature 484. It does not have a manufacturer's mark. Its full length has not been preserved, the fragment is 15 cm long, and only the complete handle and neck, with the transition to a bowl has been preserved. The handle with a neck is 13.5 cm long, its width at the widest point is 2.1 cm, and it is narrowed to 0.6 cm at the bowl and bent in the major part. At the end of the handle, there is a short, 1 cm rib in the middle, slightly marked, at which the end of the handle is rounded (Fig. 18: 1). It is very similar to the spoons that were included in the sets of Austro-Hungarian field kitchens. The only difference is the lack of markings (see *Beschreibung...* 1917, Fig. 30).

In Feature 503, the rim of a tobacco pipe lid (inv. no. 26) was discovered, placed on the bowl, in order to assemble a lid. It was made of brass and it is bent. The preserved length is 3 cm, but due to the distortion, it is impossible to determine the original diameter of the pipe bowl (Fig. 18: 2).

A Bordeaux type glass wine bottle with a wooden stopper stuck inside (inv. no. 28) was found in the fill of Feature 509. It was made of transparent, dark green glass and has been fully preserved. Its height is 23.5 cm, and its base is slightly deepened. The diameter of the regular, cylindrical body is 14 cm. Above it, there is a 3 cm long shoulder. The neck and finish are 6.5 cm long. Slightly below the lip of the finish, there is a collar of the finish with a width of 0.8 cm and a diameter of 2.8 cm, whereas the diameter of the bore (orifice) is 2.5 cm (Fig. 18: 3). It has a capacity of 375 ml, referred to as 'demie', which is a half of the standard capacity referred to as 'bouteille' or 'fillette', holding the equivalent of 3 glasses.



Fig. 18. Raciborowice-Prawda, Site 3. Personal items: 1 – tablespoon (inv. no. 12), 2 – rim of the tobacco pipe lid (inv. no. 26), 3 – Bordeaux wine bottle with stopper (inv. no. 28), 4 – bottle for high percentage alcohol (inv. no. 42). Graphic created by K. Przybysz-Malczewski

It was made from industrial green glass by pressing on a mechanical press, by placing the gob of molten glass in a profiled, durable cast-iron mould. The molten glass used for its production was devoid of gas bubbles (mainly CO₂) at the production stage by its clarification. The colour of the glass resulted from the addition at the production stage of an auxiliary raw material – iron oxide (Fe₂O₃), constituting approximately 1.5% of the molten glass, or chromium oxide (Cr₂O₃; Kielski 1969, 12, 135, 142, 149; Maćkiewicz and Świdarska-Bróz 1983, 38; Kunicki-Goldfinger 2020, 81). Most likely, that bottle was prepared for a red wine. The method used for its production was introduced in the second decade of the 19th century and became popular in the second half of the 19th century. Until the mid-20th century, those bottles were utilised, after the original product had been consumed, for storing other liquids, for instance medicines, disinfectants, or, as it can be assumed, high-proof liquors produced outside a registered distilleries, as proven by the stopper inside (Bis 2017, 389; Lipiec 2017, 180-183).

A second bottle was discovered in Feature 510 (inv. no. 42). It was in 19 fragments and was not complete due to breaking it before its deposition. It was made from transparent glass with a slightly light green tint. It was made with the use of the same technology as the first bottle. It has a cylindrical body with the diameter of 8.8 cm. The body is connected with a round, 1.9 cm wide heel, in the middle of which there is a flat base, deepened at 0.7 cm. Its distinguished, 5.2 cm long neck and finish have a cylindrical collar. The collar is placed below the 0.3 cm long lip of finish and it has a height of 1.0 cm and a diameter of 3.0 cm. The lip outside the collar has a diameter of 2.7 cm, whereas the inside of the finish, the bore has a diameter of 1.6 cm (Fig. 18: 4). It is not possible to determine its full height. Bottles of this type were intended for vodka and other high-proof liquors, *e.g.*, spirit. They have also been discovered at other sites related to First World War. One of the instances is Zalesie, Site 1, where one complete, colourless glass bottle sealed with a stopper and a fragment of another green, transparent glass bottle were found (Niebylski *et al.* 2021, 126, fig. 16, 127, 128).

Equipment of field fortifications

In Feature 483, the iron head of a tree planting bar (inv. no. 10) of undetermined provenance was discovered (Fig. 19: 1). It was hand forged, and its form and decorated reinforcements, as well as the two horseshoe nails used for fastening the handle indicate a farm (forestry) tool. Perhaps, it was taken from a farm by soldiers as a useful tool for building field fortifications. A tree planting bar could be helpful in digging in hard loess ground, which is the undisturbed subsoil at this site. Its length is 39 cm, while the working part is 19 cm long, the length of the widening winged type socket of the wooden cylindrical handle (not preserved) is 14 cm. Above the socket, there is reinforcement in the form of a 6 cm long and 2.6 cm wide spindle shaped extension, with a nail hole with a horseshoe nail inside, with a rectangular head measuring 0.5 × 0.8 cm. The width of the working part is 7.5 cm.



Fig. 19. Raciborowice-Prawda, Site 3. Field fortification equipment – tools: 1 – tree planting bar (inv. no. 10), 2 – scythe (inv. no. 37). Graphic created by K. Przybysz-Malczewski

The maximum external width of the socket is 4.9 cm. The working part at the rear is flat and led in one line to the end of the reinforcement. Nonetheless, on the front, it is thickened to 1.5 cm. On the left side of the socket, 3 cm from its upper edge, there is a nail hole with a horseshoe nail stuck in it, of the same size as the second one and it is moved by 120° in relation to it. A part with the next, symmetrical nail hole (moved by 240 degrees) has not been preserved due to the breaking apart of the fragment of the socket – a 9.5×3 cm fragment is missing; therefore, the socket did not protect from the side the handle against its falling out. This tool is of a type used to make holes in the ground for tree seedlings. The method of planting with this tool consisted of driving the blade full length into soil and vigorously pulling bar back and pushing forward, in order to push the ground away, creating a hole at that point into which the seedling would be inserted.

Another iron head of an agricultural tool is the blade of a scythe (inv. no. 37) discovered in Feature 510 (Fig. 19: 2). That tool could have been taken by a soldier from one of the nearby farms as well. The blade has not been completely preserved, because there is no tang (the part used to attach it to the handle). Despite this, the body of the tool has been preserved to its full length of 73 cm. The width of the blade in the widest place is 7.5 cm, while in the narrowest preserved one 3.5 cm. The blade is arched-bent, with a topside carved to the left side, so that scythe was designed for a right-handed person. The rib has a rectangular cross-section, which is 0.8 cm wide and 0.5 cm high. From the bottom, on the left, it is 0.4 cm wide and separated in this part from the blade by a 0.4 cm wide groove.

In Feature 510, near the stove, two rectangular sheets of steel plate with traces of burning were found (Fig. 20). The first of them was discovered at the bottom of the feature, below the stove (inv. no. 43). It had the dimensions of 66×25 cm. Among the discovered fragments, four were diagnostic ones. They show that one of the edges of the sheet had a 1.2 cm wide overlap and that sheet was secondarily bent along that edge by 4 cm to form a semi-circular roller.

The second sheet of the plate was located at a greater distance from the stove (inv. no. 44). That sheet had the dimensions of 111×32.5 cm. Two of its fragments were diagnostic ones. What they indicate is that the sheet in question also had a 1.2 cm wide overlap along one of the edges, and nails were hammered into it. One of the fragments has a straight nail hammered into it, without bends, with a square shank in the cross-section, measuring 0.3×0.3 cm and with the length of 8.2 cm. Its head is flat and round in the cross-section, with the diameter of 0.8 cm. The diagnostic fragments of the discussed sheet of plate indicate that it comes from the same source as the first aforementioned sheet, for instance they may originally have been roofing sheets from the same building. Those sheets could have been used as a stove plate, as indicated by the burning.

Two irregular fragments of charred wood serving as fuel were recovered from the stove filling in Feature 510 (inv. nos 39, 40). The former has a length of 8 cm, a width of 3.5 cm and a thickness of 2.0 cm, while the latter has a length of 6.5 cm, a width of 2.5 cm and a thickness of 1.5 cm (Fig. 21: 3, 4). It is not possible to determine from examining the

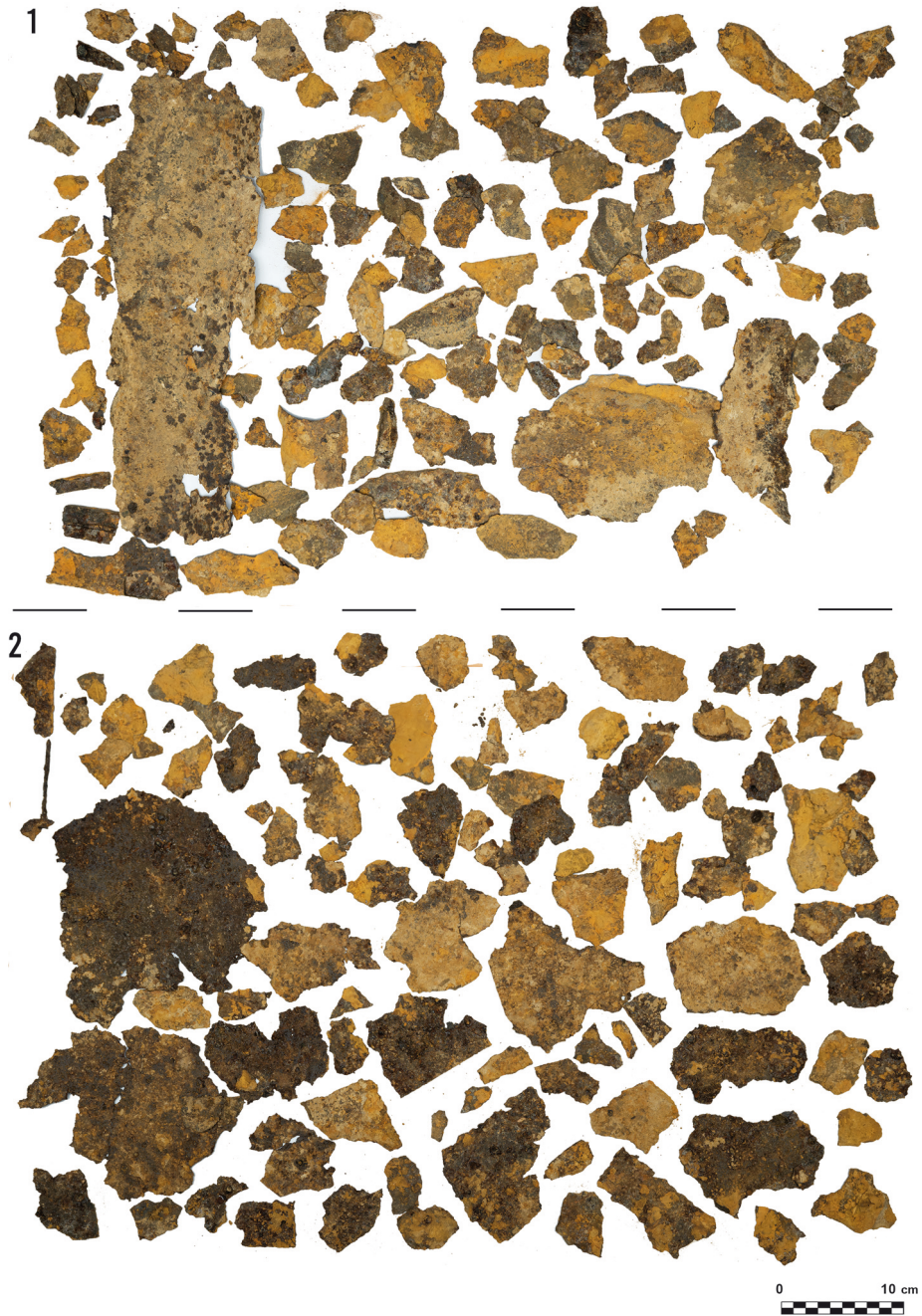


Fig. 20. Raciborowice-Prawda, Site 3. Field fortification equipment – stove elements: 1, 2 – metal sheets (inv. nos 43, 44). Graphic created by K. Przybysz-Malczewski

wood itself whether these were derived from wooden objects with a different primary function, but used as fuel, or whether they were purpose-cut firewood.

In the same feature, in the stove chamber, a burnt steel cramp and seven burnt steel nails were discovered as well (Fig. 21: 5-12). They were machine made. Six of the nails are bent, one even twice, while the other one is straight. The cramp (inv. no. 52) was made from wire round in the cross-section, with the diameter of 0.4 cm. The wire used to make it was 12 cm long. It was made by folding it in half back at the factory, in one plane, with parallel ends, thanks to which it formed a space with the inner width of 3.0 cm and a length of 4.8 cm. The chronology of that type of cramp with a shank made by cutting off steel wire round in the cross-section should be related in Europe to the period from about 1850 to the present (Nelson 1968, 7, 9; Wells 1998, 92, fig. 8, 96; Green 2014, 20, 21). The first of the nails (inv. no. 45) is straight, fully preserved. It has a length of 9.2 cm and a shank that is square in cross-section with a width of 0.4 cm. The second nail (inv. no. 46) has been fully preserved too and it has a length of 8.2 cm. Its shank has a square cross-section with the width of 0.3 cm, and its head is round in cross-section and has a diameter of 0.7 cm. It is bent at a right angle, at a distance of 3.0 cm from the head. The third nail (inv. no. 47) has the fully preserved length of 8.2 cm, a head round in the cross-section with the diameter of 0.8 cm, and a shank, 0.3 cm wide square in the cross-section. It is bent at an angle close to a right angle, at a distance of 4.5 cm from the head. Moreover, the fourth nail (inv. no. 48) has been fully preserved as well and it has a length of 6.8 cm. It has a 0.3 cm wide shank with a square cross-section and a head circular in the cross-section, with a diameter of 0.7 cm. It is bent at right angle, at a distance of 2.5 cm from the head. The fifth nail (inv. no. 49) has a fully preserved length of 8.2 cm. Its shank is square in cross-section, 0.3 cm wide and its head round in cross-section has a diameter of 0.9 cm. It is bent in two places. One of the bends is located at the distance of 2.5 cm from the head, at right angle, while the other at the distance of 6 cm from the head, also at a right angle, in the same plane, so that the end of the pin faces the head. The sixth nail (inv. no. 50) does not have the full length preserved, only 4.8 cm, without a fragment of the shank and the tip. Its shank is square in the cross-section, with a width of 0.3 cm and the head is circular in cross-section with the diameter of 0.7 cm. It has a slight bend 3.0 cm from the head. The last of the nails (inv. no. 51) has not been completely preserved either. The fragment has a length of 5.1 cm, without a fragment with the head. It has a shank with a square cross-section, a width of 0.3 cm and a bend at a right angle, 4.0 cm from the tip. It is noteworthy that the three discussed nails (inv. nos 46, 47, 49) with the length of 8.2 cm and the shank width of 0.3 cm and the head diameter of 0.7-0.9 cm are analogous to the nail hammered into the discovered metal sheet (inv. no. 44). They probably come from the same source. Perhaps, the nails and cramp come from the wooden structures of the nearby farm buildings that served as fuel, as evidenced by their discovery in the stove chamber, and the sheet that was secondarily used was attached to the stove structure with a nail obtained in that manner, or the nail was originally utilised to fix the sheet as the roofing material, and the wooden structure of

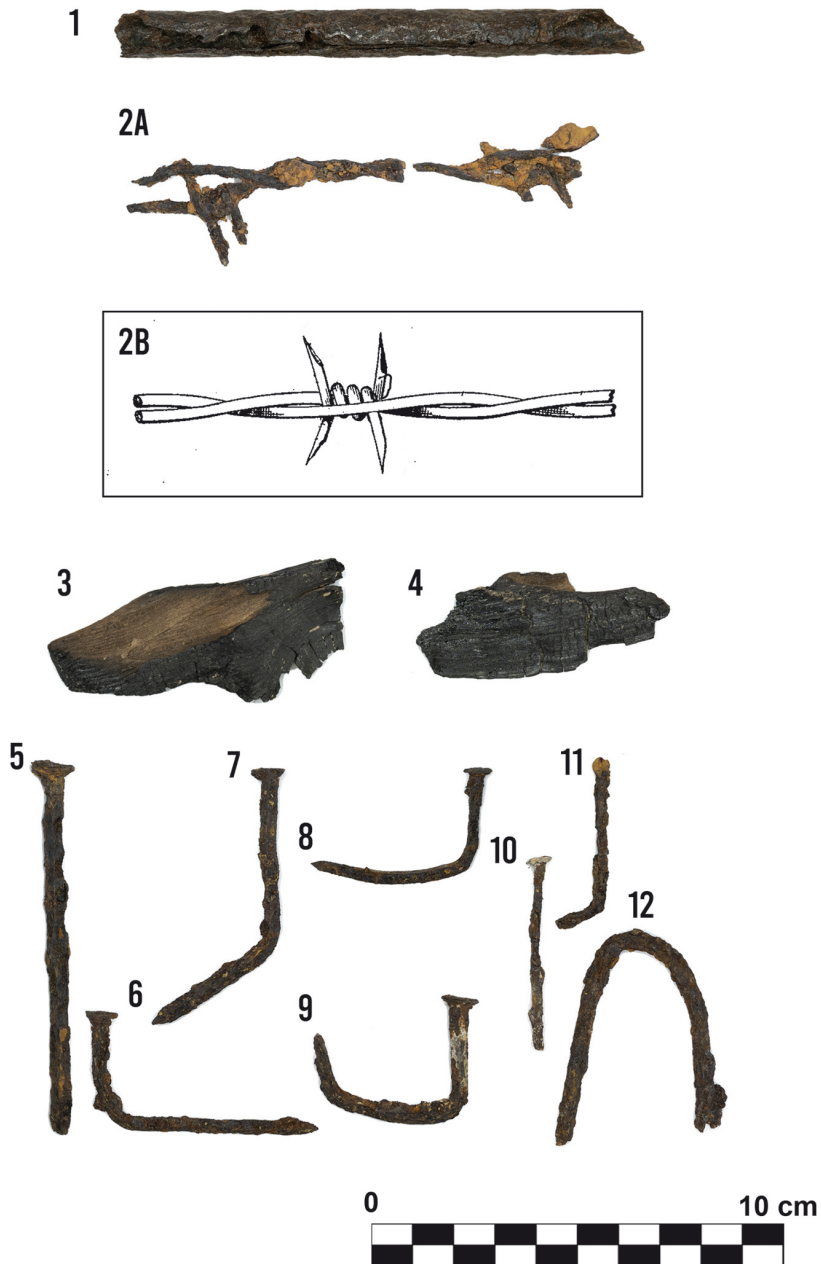


Fig. 21. Raciborowice-Prawda, Site 3. Field fortification equipment: 1 – a fragment a pipe (inv. no. 34), 2A – barbed wire (inv. no. 38), 2B – technical drawing of analogous barbed wire, 3, 4 – fragments of charred wood (inv. nos 39, 40), 5-11 – nails (inv. nos 45-51), 12 – cramp (inv. no. 52).
Graphic created by K. Przybysz-Malczewski, adapted from Clifton 1970

the roof served as fuel. Another interpretation may be the army's possession of nails used to fix the formwork of field fortifications, which were dismantled in the face of low temperatures for heating purposes, and the metal sheet was attached to the stove also with the use of the same nails.

Those nails were made from steel sheet with a thickness consistent with the obtained width of the shank. The semi-finished products of the future nails were cut at intervals consistent with the thickness of the metal sheet to form strips on which the heads were later formed by forging. That type of nail, with the tip of the shank formed through the coinciding walls and its square cross-section are dated to the first half of the 19th century to the 20th century (Nelson 1968, 7, 8). In today's Poland, they were gradually being replaced since the beginning of the first half of the 20th century with the nails obtained by mechanical cutting from steel wire, with a shank that is characteristically circular in cross-section, but their quantities were still significant (*cf.*, Nelson 1968, 10; Green 2014, 20, 21; Niebylski 2020a; Niebylski *et al.* 2021). Nails of that type, machine made with a flat, circular head and a shank square in the cross-section, have also been discovered at other positions from the Battle of Kraków, such as Sadowie-Kielnik, Site 1 and Zalesie, Site 1 (Niebylski 2020a, 578, 579, fig. 20, 582; Niebylski *et al.* 2021, 125, 146, fig. 29, 154, 156, 157, 161). Those artefacts should be interpreted as used for fixing wooden formwork of field fortifications, or they could have come from wooden elements from the nearby farm buildings, brought to the field fortifications for heating purposes.

At the bottom of the firing trench, Feature 379, a roll of plain steel wire was discovered (inv. no. 36). It is made from one piece of wire, round in cross-section with a diameter of 0.2 cm, with the length of approximately 117 m. It was rolled 117 times, creating a 8 cm wide and 5 cm thick roll. This roll has an external diameter of 38 cm, and each of the coils contains about 1 m of wire (Fig. 22). That type of wire was used to construct passive anti-personnel barriers in the foreground of field fortifications (*Russische...* 1912, 95; Perzyk 2000, 165, 170). In the Austro-Hungarian army, that type of wire with a length of 1000 m was given to each company (Mikulski 2011, 4). It was transported in rolls measuring 300 m (Zellner 1935, 351). The plain wire of that type was most often used to build tanglefoot wire obstacle, *i.e.*, linear structures made from wire stretched at the height of 15-25 cm above the ground, anchored in the ground on wooden posts (*Feldbefestigungsvorschrift...* 1908, 55, 96; *Anhaltspunkte...* 1916, 40; Mikulski 2011, 19). Tanglefoot wire obstacles secured the foregrounds of field fortifications against the enemy infantry, causing a fall. It could also be used instead of barbed wire for the same purpose, in case of its unavailability, or it could be spliced with barbed wire (*Anhaltspunkte...* 1915, 40). In addition to the construction of the tanglefoot wire obstacles, 0.2 cm thick plain wire could have been utilised to build more complex anti-personnel barriers, supplemented with 0.4 cm thick plain wire. In that manner, obstacles consisting of several lines were made, with wires stretched between posts at different heights and additionally connected with each other by posts from the adjacent lines. For instance, three lines could be 2 m apart and consist of posts spaced



Fig. 22. Raciborowice-Prawda, Site 3. Field fortification equipment: 1 – a roll of plain wire (inv. no. 36).
Graphic created by K. Przybysz-Malczewski

at intervals of 2 m, which were connected with each other by 0.4 cm thick wire at the height of 25 cm and 100 cm, both in one line and between the lines, as well as crosswise. In such an obstacle, the free spaces were additionally supplemented with 0.2 cm thick plain wire attached to the thicker strands (*Mitteilungen...* 1899, 176). The high demand for wire during the fighting in First World War is most clearly evidenced by the fact that 2000 tons of wire per week were delivered to the front for the needs of the army of the German Empire in July 1915 (von Wrisberg 1922, 107).

Furthermore, in Feature 510, a short section (12 cm long) of barbed wire (inv. no. 38) was found (Fig. 21: 2A). This consists of a strand, twisted from two strands of wire round in cross-section with a diameter of 0.25 cm. The strand is twisted counterclockwise in such a way that the wires cross each other every 1.5 cm. Two barbs have been preserved, with an undetermined distance from each other. That distance was certainly no denser than 5 cm. The barbs are wound on only one of the strands. Each barb is made of two sections of wire

with a diameter of 0.25 cm, twisted together clockwise (double barb). Each point of the barbs is turned in the opposite direction, after two full rolls around the strand, forming two loops. Thus, the barb consists of a total of 4 visible loops (4-point barb). The width of the barb is 1 cm, and its diameter is 0.7 cm. The length of the ends of the wires (points) coming from the barb and forming the spines is 1.2 cm. The distance between the ends of two points of the barb, oriented in the opposite directions, in one line, is 3 cm. That type of barbed wire was patented in the United States, by Thomas H. Dodge and Charles G. Washburn from Worcester (Massachusetts) on 24 January 1882, under number 252746 and it is referred to as Dodge-Washburn's Barb (Fig. 21: 2B; Clifton 1970, 146). At the turn of 1914 and 1915, the Russian Empire purchased ten sets of equipment for barbed wire production from the United States (Perzyk 2000, 170). With the use of barbed wire, it was possible to make various passive obstacles (see *Anhaltspunkte...* 1915, 48-59).

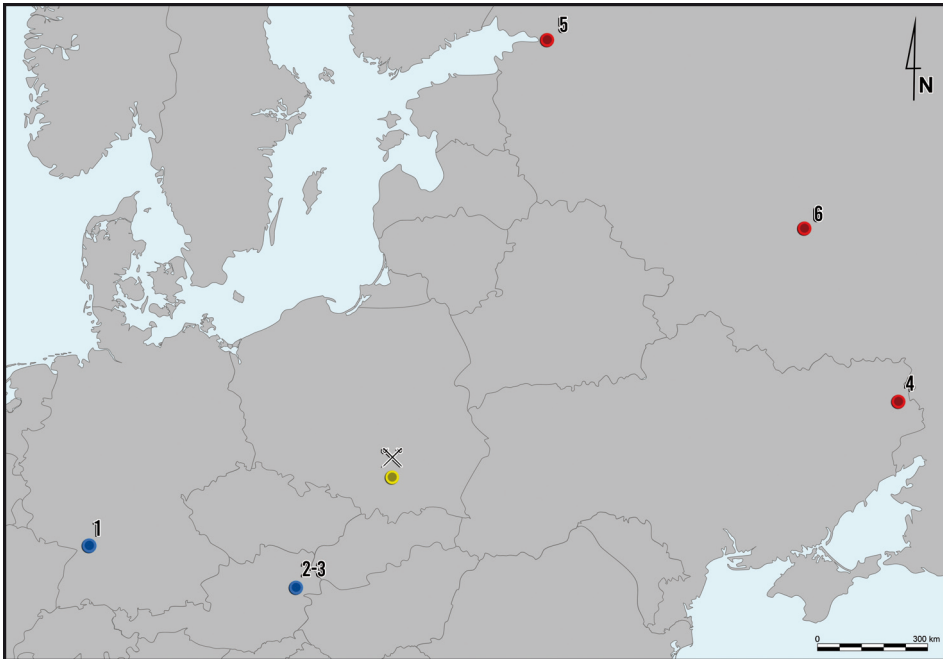


Fig. 23. The places of production of the artefacts discovered at the Raciborowice-Prawda, Site 3: 1 – Karlsruhe, Karlsruhe district (German Empire), Deutsche Waffen- und Munitionsfabriken (inv. no. 5), 2, 3 – Hirtenberg, Baden district (Austro-Hungarian Monarchy), Hirtenberger Patronen-, Zündhütchen- und Metallwarenfabrik A.G. (inv. nos 2, 3, 6, 13, 14, 17, 18) and Wöllersdorf-Steinabrückl, Wiener Neustadt-Land district (Austro-Hungarian Monarchy), K.u.k. Munitionsfabrik (inv. no. 4), 4 – Luhansk, Luhansk district (Russian Empire), Luganskiy Patronnyi Zavod Tsvetnykh Metallov (inv. nos 21, 24), 5 – Saint Petersburg, Saint Petersburg district (Russian Empire), Sankt-Peterburgskiy Patronnyi Zavod (inv. nos 20, 21, 23) and Zavod Obschestva Franko-russkikh Zavodov (inv. nos 20, 21), 6 – Tula, Tula district (Russian Empire), Torgovyi Dom G. fonGillenshmidta (inv. nos 23, 24).

Designed by J. M. Niebylski, drawn by K. Przybysz-Malczewski

The fact that the barbed wire has solely been discovered in Feature 510 allows reconstructing the image of the foreground of a fortified position of that type. That feature (shooting post) was the only element of the fortifications extended in the northern direction beyond the line, the front of which was facing that side, as evidenced by the front trench niches. Perhaps only in the vicinity of that feature was an obstacle made from wire placed so close to the field fortifications. Most probably, the discovered position was secured by an obstacles made of wire on the north, in a longer section. This position is for all around defence, and the discovered fragment of its course is located on the north-western side. Possibly, in the remaining, unexcavated parts, there are also similar fortifications, in the foreground of which (that is on the outside), there were also obstacles made from barbed wire. This position is the only battlefield discovered so far related to the Russian offensive on Kraków in 1914, where both barbed wire and plain wire with a military purpose were discovered.

What is more, an unspecified steel pipe has been discovered at the site, which was located in the barrow (inv. no. 34). It is made from a thin, rolled metal sheet bent along the longer edge, with no preserved ends on either side. The preserved length is 13.5 cm, and its diameter is 1.2 cm (Fig. 21: 1).

The discovered items bearing the manufacturer's markings testify to their production in the plants located then in the following areas:

German Empire – Karlsruhe, Karlsruhe district, Deutsche Waffen- und Munitionsfabriken (inv. no. 5);

Austro-Hungarian Monarchy – Hirtenberg, Baden district, Hirtenberger Patronen-, Zündhütchen- und Metallwarenfabrik A.G. (inv. nos 2, 3, 6, 13, 14, 17, 18), Wöllersdorf-Steinabrückl, Wiener Neustadt-Land district, K.u.k. Munitionsfabrik (inv. no. 4);

Russian Empire – Luhansk, Luhansk district, Luganskiy Patronnyi Zavod Tsvetnykh Metallov (inv. nos 21, 24), Saint Petersburg, Saint Petersburg district, Sankt-Peterburgskiy Patronnyi Zavod (inv. nos 20, 21, 23) and Zavod Obschestva Franko-russkikh Zavodov (inv. nos 20, 21) and Tula, Tula district, Torgovyi Dom F. G. fonGillenshmidta (inv. nos 23, 24; Fig. 23).

INTERPRETATION AND SUMMARY

The defensive position discovered at the site using the barrow for the purpose of fortification, represents the statutory type of field fortifications of the Russian army utilised during First World War (Modrakh 1914). It consists of a position for all around defence, surrounding the top of the barrow, leaving a space at the centre. There were two trench niches on the north. From the ring-trench, a firing trench was extended in the western direction, with a connecting trench developed in the southern direction, leading to a dugout. That firing trench had twenty trench niches on the north side. From the south, there were

two trench niches. In the extension of the trench in the western direction, there were twenty one-man prone foxholes, not connected by the trench, which testifies to the unfinished work on that fortification. If they had been combined, they would have become front-facing trench niches. To the north of the trench, a shooting post with a stove built inside was constructed.

The discovery of barbed wire in that feature proves the presence of a passive anti-personnel obstacles made in the foreground of the position. What is more, in the trench, a roll of plain wire with a length of about 117 m was discovered that could have been used for building or repairing such obstacles. This firing position is the only portion of battlefield landscape from First World War discovered so far, related to the Battle of Kraków, where such obstacles made from barbed wire have been confirmed by artefacts.

Most likely, agricultural and forestry tools, which were not included in the military equipment, were used to create that fortified position. These include the tree planting bar and the scythe. For the construction of the stove, two metal sheets discovered in its vicinity were used, probably coming from the farm buildings nearby.

Several artefacts recovered by the excavation confirm that these are Russian fortifications. These were: an M1909 cartridge pouch with six charger clips including 7.62 × 54 mm R M1908 cartridges; one M1891 cartridge charger clip; a case of unfired 7.62 × 54 mm R M1891 ammunition with traces of bullet break apart; and a case of unfired 7.62 × 54 mm R M1908 ammunition. Those artefacts indicate that the soldiers in that position had not engaged in combat.

The position in question was probably extended in the eastern direction, beyond the area of the investigations and the unexcavated element may have had a form analogous to the discovered one, constituting its mirror image. Therefore, it was an autonomous position, fortifying a hill with a barrow, with a good view of the surrounding area. The number of trench niches created on the north (20), combined with their number of trench niches on the south (two) indicates that the foreground of the position was located in the north, while the rear was to the south. Hence, the niches located on the north side were the front trench niches, whereas in the south, the rear ones. That has additionally been confirmed by the location of the dugout, which has been found in the rear. Thus, most likely, similar fortifications were also located on the south side of the barrow, securing the position from there. The view from the trench in the direction of the foreground is horizontally 60°, while from the niche, in the same direction, 120°. Combining the data on the length of the discovered position, the number of front trench niches and the number of one-man prone foxholes in the unfinished fragment of the position, indicates that the position was prepared for two platoons of soldiers, *i.e.*, 100 people.

Historical sources point out that the Russian troops reached the area of the village of Raciborowice, that is the area of the barrow from the north, after the end of the Battle of Kraków. That took place after the strategic retreat of the Austro-Hungarian troops into the area of the range of fortress artillery, which was completed on 28 November 1914. During

First World War, that elevation was called 'Hill 305'. The Russian troops raised that position in order to block the Kraków Fortress. Against them were operating the 106th Landsturm Infantry Division and the 1st and 110th Landsturm Infantry Brigade, located south of the Russian positions. On the afternoon of 30 November, the Russian artillery fired on the Fort no. 49a 'Dłubnia' and Fort no. 49 'Krzesławice', hitting it twice with a high-explosive shells. Those forts responded with artillery shelling of the Russian positions. Until 5 December, Fort no. 49a 'Dłubnia' and Fort no. 49 1/4 'Grębałów' continued artillery shelling of the Russian positions, sending their mobile batteries under the cover of the infantry. It is from that stage of the fighting comes the 12 cm M1861 high-explosive shell discovered at the site, which hit Feature 534, located on the southern slope of the barrow. At that time, only Fort no. 49 'Krzesławice' was armed with Warendorff's 12 cm M1861 guns, the number of which was four. The barrow was within the range of those cannons; hence, it can be concluded that the position was hit by a shell from that fort. Therefore, that fortified position was built too close to the defensive ring III (outer) complex of forts of the Kraków Fortress, being exposed to shelling.

On 2 December, the 110th Landsturm Infantry Brigade was ordered to carry out an attack on Hill 305, *i.e.*, the barrow in Prawda, which was conducted with the support of mobile heavy artillery batteries. That order was issued in relation to the presence of the Russian troops on that hill. on the night of 4 December and on 5 December, the fighting for the hill in Prawda continued, in relation to the order to attack it by the 35th and 110th Landsturm Infantry Brigade, which was conducted with the support of 5 mobile heavy artillery batteries, under the command of Major General Aust. It was carried out after dusk, from the east, from the area of Kocmyrów. On 7 December, the enemy's activity in the range of fortress artillery in the northeast and east direction, *i.e.*, in the area of the barrow in Prawda, was no longer identified. At that time, the Russian troops withdrew from their positions.

Therefore, it should be concluded that the discovered position was created by the Russian troops between 28 November and 6 December 1914. The high-explosive artillery shell discovered at the site was fired from Fort no. 49 'Krzesławice' most likely on 30 November or later, although there is no confirmation in historical sources of the use of that fort's artillery in the following days. Direct battles for the barrow in Prawda lasted from 2 December certainly until 5 December, although there are no data in historical sources concerning the events of 6 December. Surely, on 7 December, there were no Russian soldiers in the area of the site.

The fact that the Austro-Hungarian troops captured the discovered position and carried out actions against the Russian troops has been confirmed by the discovery of items of Austro-Hungarian provenance, testifying to the presence of soldiers of that army. These are the following items: five cans of rations, adjustment pin of the M1887 calfskin knapsack, M1908 cartridge pouch for a carbine, tent peg of a M1893 tent sheet, unfired cartridge of 8 × 50 mm R M1893 ammunition, two charger clips with cartridges of 7 × 57 mm

M1893 ammunition, unfired cartridge of 7 × 57 mm M1893 ammunition, three fired cases of 7 × 57 mm M1893 ammunition, and three charger clips of ammunition 7 × 57 mm M1893 ammunition. Two other fired 7 × 57 mm M1893 ammunition cases, were discovered as single stray finds, from fills of other features located in the north and west of the analysed position. What this means is that after capturing that position, the Austro-Hungarian soldiers conducted firing on the Russian troops from the firing trench and the fortified position for all around defence, located at the centre of the barrow. They fired at least several shots. They were armed with Mannlicher M1895 rifles or carbines (8 × 50 mm R M1893 ammunition cartridge has been found, as well as an M1908 cartridge pouch for the carbine) and Steyr M1912 rifles (two charger clips with cartridges of 7 × 57 mm M1893 ammunition, unfired cartridge of 7 × 57 mm M1893 ammunition, five fired cases of 7 × 57 mm M1893 ammunition and three cartridges of 7 × 57 mm M1893 ammunition have been found). The discovery of ammunition for charging the Steyr M1912 rifle is the confirmation of historical sources regarding the units fighting for Hill 305 with the barrow in Prawda, as those were the soldiers of the reserve units – Landsturm, that were armed with that model of rifle.

Moreover, what has been discovered at that position includes items that were privately owned by soldiers. These are the following personal items: a tin tablespoon, a rim of the tobacco pipe lid, a Bordeaux wine bottle, made from dark green glass with stopper and a bottle of vodka or other high-proof liquors, made from light green glass. These items give an insight into the material culture of the soldiers taking part in First World War (*cf.*, Niebylski and Tunia 2018, 932, 933; 2019, 47). They also indicate that the soldiers spent their time consuming alcohol and smoking. On the other hand, they demonstrate shortages in equipment, indicated by a discovered civilian tablespoon. The army supplies did not provide cutlery for the soldiers of the Russian army, which may indicate the provenance of that utensil.

The discovered Russian position was the largest territorial gain of that army in that area, north of Kraków and east of Kończyce, Kraków district, towards the Fortress. The conclusions drawn fill a gap in the knowledge of military operations taking place after the end of the Battle of Kraków, *i.e.*, after 16–28 November 1914, before the combat on the right bank of the Vistula River. They constitute a testimony to the combat readiness of the Kraków Fortress and the success of the strategic plan of the Chief of the General Staff of the Austro-Hungarian Army, Field Marshal Franz Conrad von Hötzendorf. The plan assumed slowing down the Russian offensive in an engagement north of Kraków, engaging the enemy in combat and redeploying troops to the southern bank of the Vistula River, in order to attack the Russian 3rd Army advancing in that place. The combat of Hill 305 with the barrow in Prawda consisted of simultaneously preventing the enemy from entering the Fortress and engaging Russian troops in combat, in order to protect the redeployment of troops to a new area of military operations. That plan was successfully implemented and the operation was successful. That led to withdrawing the front to the south-east, conduct-

ing the victorious Operation Limanowa-Łapanów, and then shifting the fighting to the Carpathians, and, consequently, repelling the Russian troops from the entire territory of Galicia, which ended military operations of First World War in that area.

References

- Adjustierungsvorschrift... 1910. *Adjustierungsvorschrift für das k. u. k. Heer. I. Teil.* Wien: k. k. Hof- und Staatsdruckerei.
- Adjustierungsvorschrift... 1911. *Adjustierungsvorschrift für das k. u. k. Landwehr. I. Teil.* Wien: k. k. Hof- und Staatsdruckerei.
- Anhaltspunkte... 1915. *Anhaltspunkte für die Ausführung von Feldbefestigungen, Maßnahmen und Einrichtungen gegen Massenfeuer schwerer Artillerie.* Wien: K. u. k. Armeeoberkommando.
- Anhaltspunkte... 1916. *Anhaltspunkte für die Ausführung und Verteidigung von Feldbefestigungen. Maßnahmen und Einrichtungen gegen Massenfeuer schwerer Artillerie.* Wien: K. u. k. Armeeoberkommando.
- Artillerieunterricht... 1906. *Artillerieunterricht für die k. u. k. Festungsartillerie. I. Teil, 1. Heft. Allgemeiner Teil.* Wien: k. k. Hof- und Staatsdruckerei.
- Arz von Straußenburg A. 1924. *Zur Geschichte des Grossen Krieges 1914-1918.* Wien, Leipzig, München: Rikola Verlag A. G.
- Bator J. 2008. *Wojna galicyjska.* Kraków: Wydawnictwo Libron.
- Benda A. 1919. *Werk der Artillerie.* Wien: Adolf Holzhausen.
- Beschreibung... 1917. *Beschreibung der geprotzten Dreikesselfahrküche M. 17 (kleinen Fahrküche).* Wien: k. u. k. Kriegsministeriums.
- Birnstein J. 1911. *Zugschule. Instruktionsbuch für Chargen, Chargenschüler und Einjährig-Freiwillige.* Pilsen: Ersten Westböhmisches Druckindustrie- Aktiengesellschaft.
- Bis M. 2017. Nowożytnie naczynia szklane znalezione w Warszawie – możliwości i ograniczenia badań. *Kwartalnik Historii Kultury Materialnej* 65(3), 371-396.
- Brzoskwinia W. 1994. *Fort 49 'Krzesławice' (= Atlas Twierdzy Kraków, Seria 1, Tom 2).* Kraków: Urząd Miasta Krakowa, Wydział Ochrony Zabytków.
- Budziszewski J., Jarosz P., Libera J., Szczepanek A., Witkowska B. and Włodarczak P. 2016. Kurhany ze stanowiska 30 w Stryjowie, pow. krasnostawski. In P. Jarosz, J. Libera and P. Włodarczak (eds), *Schylek neolitu na Wyżynie Lubelskiej.* Kraków: Instytut Archeologii i Etnologii PAN, 381-409.
- Bushmakov D. A. 2017. *Russkaya armiya v velikoy voyne, 1914-1917 gg. Tom I.* Moskva: Krasivaya Kniga.
- Bussard M. 2017. *Ammo Encyclopedia For all Rimfire and Centerfire Cartridges, plus Shotshells.* Minneapolis: Blue Book Publications.
- Chrzanowski Ł. 2008. *Artyleria austro-węgierska w latach 1860-1890.* Przemyśl: Wydawnictwo „Fort” – Tomasz Idzikowski.

- Chumak R. N. 2007. *Russkiy 7,62-mm vintovochnyi patron. Istoriya i evolutsiya*. Sankt-Peterburg: Atlant.
- Ciemiński J. 2014. *Znakowanie łusek wojskowej amunicji strzeleckiej wybranych krajów europejskich* (= *Archeologia Wojenna Extra* 1). Gdów: Instytut Wydawniczy Archeologia Militaris.
- Clifton R. T. 1970. *Barbs, Prongs, Points, Prickers, & Stickers: A Complete and Illustrated Catalogue of Antique Barbed Wire*. Norman: University of Oklahoma Press.
- Dąbrowski J. 2009. *Carskie trzy linie. Rosyjski 3" nabój karabinowy (7,62 x 54R) w latach 1891-1917*. Warszawa: Self-published.
- Ehnl M. and von Sacken E. 1938. *Österreich-Ungarns letzter Krieg 1914-1918. Registerband*. Wien: Verlag der Militärwissenschaftlichen Mitteilungen.
- Ehrenhalle... 1916a. *Ehrenhalle der k. k. Landwehr, des k. k. Landsturmes und der k. k. Gendarmerie. Heft 3. Territorialbereich Krakau*. Wien: Gesellschaft für graphische Industrie.
- Ehrenhalle... 1916b. *Ehrenhalle der k. k. Landwehr, des k. k. Landsturmes und der k. k. Gendarmerie. Heft 4. Territorialbereich Leitmeritz*. Wien: Gesellschaft für graphische Industrie.
- Ehrenhalle... 1916c. *Ehrenhalle der k. k. Landwehr, des k. k. Landsturmes und der k. k. Gendarmerie. Heft 5. Territorialbereich Prah*. Wien: Gesellschaft für graphische Industrie.
- Ehrenhalle... 1917a. *Ehrenhalle der k. k. Landwehr, des k. k. Landsturmes und der k. k. Gendarmerie. Heft 6. Territorialbereich Graz*. Wien: Gesellschaft für graphische Industrie.
- Ehrenhalle... 1917b. *Ehrenhalle der k. k. Landwehr, des k. k. Landsturmes und der k. k. Gendarmerie. Heft 7. Territorialbereich Lemberg*. Wien: Gesellschaft für graphische Industrie.
- Feldbefestigungsvorschrift... 1908. *Feldbefestigungsvorschrift für die Truppen des k. u. k. Heeres*. Wien: k. k. Hof- und Staatsdruckerei.
- Feldzug... 1917. *Der Feldzug von Krakau (6. November bis 17. Dezember 1914)* (= *Österreichisch-ungarische Kriegsberichte* 6). Wien: Verlag von L. W. Seidel und Sohn.
- Green J. A. 2014. Dating Modern Wire Nails. *Newsletter of the Louisiana Archaeological Society* 42(3), 20-21.
- Haładaj K. and Rozdżestwieński P. 2010. *Karabiny i karabinki Mauser 98 w Wojsku Polskim w latach 1918-1939*. Warszawa: Wydawnictwo ZP.
- Heldenwerk... 1917. *Heldenwerk 1914-1916. Ein literarisches Monumentalwerk zum ewigen Gedenken an die ruhmvollen Waffentaten der österreichisch-ungarischen Armee und ihrer Helden. I. Band*. Wien: Heldenwerk Verlags- und Vertriebs.
- von Horstenau G. E. 1932. *Österreich-Ungarns letzter Krieg 1914-1918*. Wien: Verlag der Militärwiss. Mitteilungen.
- Hýkel J. and Malimánek V. 1998. *Náboje do ručních palných zbraní*. Praha: Naše vojsko.
- Instruktion... 1913. *Instruktion über die Einrichtung und Verwendung der Maschinengewehre. I. Heft. Maschinengewehr (Schwarzlose) M. 7*. Wien: k. k. Hof- und Staatsdruckerei.
- Instruktion... 1916. *Instruktion über die Einrichtung und Verwendung der im Gebrauche stehenden Gewehre M. 14*. Wien: k. u. k. Kriegsministeriums.
- Iwański M. 2018. Kurhany w Guciowie, powiat zamojski w świetle obrazowań lotniczym skanerem laserowym. In J. Górski and A. Tynieć (eds), *Fenomen miejsca. Nekropola kurhanowa z neolitu*,

- epoki brązu i wczesnego średniowiecza w Guciowie, pow. Zamojski* (= Biblioteka Muzeum Archeologicznego w Krakowie 6). Kraków: Muzeum Archeologiczne w Krakowie, 37-52.
- Jarosz P., Koledin J., Podsiadło M. and Włodarczak P. 2021. Excavation of 'Medisova humka' in Žabalj. In P. Jarosz, J. Koledin and P. Włodarczak (eds), *Danubian Route of the Yamnaya Culture. The Barrows of Vojvodina* (= *The Yamnaya Impact on Prehistoric Europe* 3). Budapest: Archaeolingua, 103-135.
- Jung P. 2017. *Armia austro-węgierska w I wojnie światowej (1). 1914-1916* (= *Men-at-Arms* 392). Oświęcim: Napoleon V.
- Karczewski A. W. 1934. *Broń małokalibrowa. Zarys teorii strzału, konstrukcja i wykonanie* (= Biblioteka 'Prac Badawczych P. W. U' 2). Warszawa: Wydawnictwo Państwowych Wytwórni Uzbrojenia w Warszawie.
- Kerchnawe H. 1935. *Ehrenbuch unserer Artillerie. Band 1*. Wien: Amon Franz Göth.
- Kielski A. 1969. *Ogólna technologia ceramiki*. Kraków: Akademia Górniczo-Hutnicza w Krakowie.
- Kisak P. F. 2016. *A Comprehensive Guide to Rifle Ammunition. Vol. 2 of 2*. Virginia: Diamond Publications.
- Krčma V., Hýkel J. and Neshyba P. 2016. *Atlas nábojů do ručních palných zbraní*. Praha: Naše vojsko.
- Kunicki-Goldfinger J. J. 2020. *Szkło w Europie Środkowej od późnego średniowiecza do XVIII wieku. Skład chemiczny – uwarunkowania i interpretacja*. Warszawa: Instytut Chemii i Techniki Jądrowej.
- Kurek J. W. and Kurek M. 2002. *Artyleria Twierdzy Przemyśl. Artyleria forteczna*. Przemyśl: Drukarnia San Set.
- Labbett P. 1982. *Encyclopédie Mondiale des Munitions Modernes: Armes Militaires Légères*. Paris: Pygmalion.
- Lipiec A. 2017. Zabytki szklane pozyskane w trakcie badań zespołu kamienic na rogu ulicy Traugutta i placu Małachowskiego w Warszawie. In W. Borkowski (ed.), *Badania archeologiczne dziedzina Arsenału Królewskiego oraz zespołu Kamienicy Raczyńskich w Warszawie* (= *Warszawskie Materiały Archeologiczne* 14). Warszawa: Państwowe Muzeum Archeologiczne w Warszawie, 169-196.
- Lukasik H. 2009. *Twierdza Kraków. Wokół krakowskiej twierdzy. Epizody, bohaterowie, ślady bitwy o Kraków 1914. Część IV*. Międzyzdroje, Kraków: Arkadiusz Wingert.
- Lukaszewski T. 2016. *Amunicja karabinowa*. Oświęcim: Napoleon V.
- Maćkiewicz J. and Świdarska-Bróz M. 1983. Analiza technologii produkcji szkła jako źródła powstawania ścieków. *Ochrona środowiska. Informator Dolnośląskiego Oddziału PZITS. Materiały szkoleniowo-informacyjne* 3/4, 37-40.
- Majstorović V. 2016. The Red Army in Yugoslavia, 1944-1945. *Slavic Review* 75/2, 396-421.
- Merkblätter... 1918. *Merkblätter über eigene und fremdländische Hand- und Faustfeuerwaffen*. Wien: k. u. k. Technischen Militärkomitee.
- Mikulski M. J. 2011. Austro-węgierskie fortyfikacje polowe w Galicji i Królestwie Kongresowym w latach 1914-1916. In M. Łopata and K. Ruszała (eds), *Materiały z konferencji Znaki pamięci IV – w 95.*

- Rocznice Bitwy Gorlickiej*. Gorlice: Stowarzyszenie Aktywnej Ochrony Cmentarzy z I Wojny Światowej w Galicji „Cruce Galicie”, 1-43.
- Mirosz D. 2007. *Almanach dat 1799-1918*. Warszawa: Dom Wydawniczy Bellona.
- Mitteilungen... 1899. *Mitteilungen über Gegenstände des Artillerie- und Geniewesens*. Wien: k. und k. Technischen Militär- Comité.
- Modrak A. V. 1914. *Gnazdnye ili 'russkie okopy'*. Grodno: Tipografiya S. Gan.
- Mötz J. 1996. *Österreichische militärpatronen. Band 1. Die Munition für Hand- und Faustfeuerwaffen der habsburgischen bzw. Österreichischen Streitkräfte von 1866 bis 1954*. Wien: Verlagsbuchhandlung Stöhr.
- Mroczkowski K. and Kawa L. 2020. *Wojna widziana z kuchni... i kuchnia na wojnie*. Bydgoszcz: Wydawnictwo Gaj.
- Nachrichten... 1915. *Nachrichten über Verwundete und Kranke ausgegeben am 29./5. 1915. Nr. 410*. Wien: k. k. Hof- und Staatsdruckerei.
- Nelson L. H. 1968. *Nail chronology as an aid to dating old buildings*. Nashville: American Association for State and Local History.
- Niebylski J. 2020a. The remains of the 'Battle of Kraków', fought during World War I, as exemplified by site Sadowie-Kielnik 1, Kraków district. *Sprawozdania Archeologiczne* 72/2, 555-584.
- Niebylski J. 2020b. Wielka Wojna na nadwiślańskim przedpolu Twierdzy Kraków. In K. Tunia (ed.), *Kartki z dziejów igolomskiego powiśla*. Igołomia, Pękowice: Wydawnictwo Profil-Archeo, 251-272.
- Niebylski J. 2021a. Bitwa krakowska. Materialne pozostałości I wojny światowej pod Krakowem w świetle badań archeologicznych. In J. M. Chyla, D. Socha and A. Cetwińska (eds), *Keeping Archaeology Together*. Warszawa: Uniwersytet Warszawski, 34.
- Niebylski J. 2021b. Wielka Wojna na nadwiślańskim przedpolu Twierdzy Kraków. In K. Tunia (ed.), *Kartki z dziejów igolomskiego powiśla*. Igołomia, Pękowice: Wydawnictwo Profil-Archeo, 292-312.
- Niebylski J. M. and Czarnowicz M. 2022. Rola pozycji polowej z bitwy pod Krakowem z I wojny światowej odkrytej na stanowisku archeologicznym Wola Węclawska 10, pow. krakowski. *Raport Archeologiczny* 17, 73-118.
- Niebylski J. M., Czarnowicz M. and Micyk P. 2021. Bitwa pod Krakowem z 1914 r. w świetle badań archeologicznych stanowiska Zalesie 1, pow. krakowski, gm. Iwanowice. *Raport* 16, 103-167.
- Niebylski J. and Tunia K. 2018. The German-Russian Front in Southern Poland, Winter 1945: History and Archaeology. In K. Kleinová (ed.), *24th Annual Meeting (Barcelona, 2018)*. Barcelona: European Association of Archaeologists, 932-933.
- Niebylski J. and Tunia K. 2019. Ekshumacja żołnierzy Armii Czerwonej na cmentarzu wojennym w Chrzanowie, woj. małopolskie. Nieregularne wyposażenie odkryte przy poległych. In A. Zakościelna (ed.), *Badania archeologiczne w Polsce środkowowschodniej, zachodniej Białorusi i Ukrainie w roku 2018*. Lublin: Instytut Archeologii Uniwersytetu Marii Curie-Skłodowskiej w Lublinie, Muzeum Lubelskie w Lublinie, 46-47.

- Notes... 1917. *Notes on Austro-Hungarian Fuzes*. London: Harrison and Sons.
- Orman K. and Orman P. 2015. *Wielka Wojna na Jurze. Działania i cmentarze wojenne z roku 1914 na Wyżynie Krakowsko-Wieluńskiej i terenach przyległych*. Kraków: Wydawnictwo Libron.
- Ortner C. M. 2007. *The Austro-Hungarian Artillery from 1867 to 1918. Technology, Organization and Tactics*. Vienna: Verlag Militaria.
- Ortner C. M. and Hinterstoisser H. 2013. *The Austro-Hungarian Army in the First World War. Uniforms and Equipment – from 1914 to 1918. Volume 2*. Vienna: Verlag Militaria.
- Ostrowski W. 2018. *Karabiny maszynowe od czasów najdawniejszych do wynalazków ostatniej doby*. Oświęcim: Napoleon V.
- Österreichisch-Ungarische... 1915. *Österreichisch-Ungarische Kriegswoche: Illustrierte Wochenausgabe* 40 from 18.07.1915.
- Pałosż J. 2012. *Śmiercią złączeni. O cmentarzach z I wojny światowej na terenach Królestwa Polskiego administrowanych przez Austro-Węgry*. Kraków: Wydawnictwo Libron.
- Przyk B. 2000. Rosyjskie fortyfikacje polowe w kampaniach 1914-1915. In J. Chorzępa and A. Wap (eds), *Twierdze i działania wojenne na ziemiach polskich w czasie I wojny światowej. Materiały z międzynarodowej konferencji naukowej zorganizowanej w ramach krajowego programu Ministerstwa Kultury i Sztuki „Ochrona i konserwacja architektury obronnej” Osowiec-Twierdza 16-18 październik 1998 r.* Białystok, Przasnysz: „Forteca”, 159-180.
- Piwowski J. 1935. Rejestr zabytków przedhistorycznych znajdujących się na terenie powiatu miechowskiego. *Wiadomości Archeologiczne* 13, 179-184.
- RGVia, Fond 2067, Shtab glavnokomanduyushchego armiyami Yugo-Zapadnogo fronta; Opis: №1, Upravlenie general-kvartirmeystera; Delo: №130, Ob atake i osade Krakova. Rossiyskiy Gosudarstvennyi Voenno-istoricheskiy arkhiv (RGVia), Moskva, unpublished.
- Russische... 1912. *Die russische Armee*. Wien: k. k. Hof- und Staatsdruckerei.
- Sbornik... 1915. *Sbornik opisaniy predmetov i materialov zagotovlaemykh Intendantstvom dlia dovolstviya voysk*. Petrograd: Tipografiya Shtaba voysk Gvardii i Petrogradskago Voennago Okruga.
- Schall M. 1915. *Preis – Katalog der Kappen-, Tschako- und Iniformsorten-Fabrik Max Schall, Wien III., Fasangasse Nr. 32. Ausrüstungssorten, Sportartikel, Wirkwaren, Sattelzeug und Pferde-requisiten, Proprietäten, Toiletteartikel, Galanteriewaren, Herrenmodeartikel, Reiserequisiten, Rauchrequisiten, Haushaltungsgegenstände etc.* Wien: Ferdinand Brück & Söhne.
- Schäfer H. 1934. *Österreichs Volksbuch vom Weltkrieg*. Wien: GM. d. R. Franz Schubert.
- Schießtafeln... 1908. *Schießtafeln für die k. u. k. Festungs-Artillerie. Schießtafeln für 12 cm Kanonen M. 61 (M. 61/95), (für erweiterten Schrapnelltrag)*. Wien: k. k. Hof- und Staatsdruckerei.
- Schmid H. 1914. *Taktisches Handbuch*. Wien: Selbstverlag Hugo Schmid, Kommissionsverlag L. W. Seidel & Sohn k. u. k. Hofbuchhändler.
- Schubert J. 2018. Cmentarze wojenne Twierdzy Kraków z lat 1914-1918 i ich autor, rzeźbiarz Karl Korschann. *Państwo i Społeczeństwo* 18(2), 171-206.
- Urbanski von Ostrymiecz A. 1939. *Conrad von Hötzendorf: Soldat und Mensch*. Graz, Leipzig, Wien: Ulrich Mosers Verlag.

- Veltzé A. 1919. *Die Geschichte des Weltkrieges mit besonderer Berücksichtigung der Tätigkeit der österreich-ungarischen Heere. I. Band.* Wien: Verlag für vaterländische Literatur.
- Verlustliste... 1915. *Verlustliste ausgegeben am 3./1. 1915. Nr. 91.* Wien: k. k. Hof- Staatsdruckerei.
- Viribus... 1919. *Viribus unitis: Österreich-Ungarn und der Weltkrieg.* Wien: Verlag der Gesellschaft vom Silbernen Kreuz.
- Wells T. 1998. Nail Chronology: The Use of Technologically Derived Features. *Historical Archaeology* 32/2, 78-99.
- Woodard T. W. 2011. *Shooter's Bible. Guide to Cartridges.* New York: Skyhorse Publishing.
- von Wrisberg E. 1922. *Wehr und Waffen 1914-1918.* Leipzig: Verlag von K. F. Koehler.
- Wrobel K.-H. 1999. *Drei Linien. Die Gewehre Mosin-Nagant.* Schwäbisch Hall: Journal-Verlag Schwend GmbH.
- Zellner E. 1935. *Taktikaufgabe 1 (Applikatorische Besprechung: Ein verstärktes Infanterieregiment mit angewiesener Artillerie in Verteidigung im Bewegungskrieg)* (= *Militärwissenschaftliche Mitteilungen* 66). Wien: Österreichischen Bundesministerium für Landesverteidigung, 350-370.
- Zusammenstellung... 1913. *Zusammenstellung der wichtigsten Adjustierungs- und ballistischen Daten der Geschützmunition der k. u. k. Artillerie.* Wien.
- Żuk A. B. 2016. *Karabiny, karabinki i pistolety maszynowe. Encyklopedia długiej broni wojskowej XX wieku.* Warszawa: Bellona, Fundacja Historia i Kultura.

