ОРИГИНАЛЬНЫЕ СТАТЬИ

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AN ENQUIRY INTO GUNPOWDER WEAPONS USED BY HÜLEGÜ IN THE MIDDLE EAST CAMPAIGN

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Abstract: *Research objectives:* To establish whether Hülegü brought gunpowder from China during his military operation in the Middle East in 1256–1260 and whether his army used gunpowder weapons against the Hashashi/Hashashin castles.

Research materials: The article's author examines Islamic and Chinese sources mentioning Hülegü's military campaign from Mongolia to the Middle East and weapons used by the Mongolian army.

Results and novelty of the research: Most researchers agree that the Mongols used gunpowder weapons adapted from the Chinese in their East Asian military expeditions, such as in China, Japan, Korea, and Java. However, it is still debated whether the Mongols used gunpowder and gunpowder weapons in their military campaigns in the West. Some researchers state that the Mongols did not use gunpowder in the European campaign and that naphtha was the main incendiary they used in the Middle East campaign. Few studies examine whether the Mongols carried gunpowder to the West.

Islamic source writers described China's novel weapons and chemicals in more familiar terms, such as *naphtha*. Especially when the information given by Hamdallah Mustawfi, Ata-Malik Juvayni, and Qutb al-din Shīrāzī about the Mongol Siege of Maymun-Diz in 1256 is compared with the Chinese military manual *Wujing Zongyao*, it is evident that the Mongols transported ballistas with three bows called "ox crossbow" from China. It turns out that these ballistas fired "rocket-assisted arrows". These arrows carried paper tubes filled with gunpowder, which would increase their range to reach the mountain fortress of Maymun-Diz, and bombs covered with cartons, bamboo, ceramic, or metal which would set fire to the defenders of the fort. These ballistas are referred to as *baban* in Armenian sources and as "naphtha tools" in the Mongols' siege of Baghdad. The most original aspect of the present article is the hypothesis that the information in Mustawfi's work regarding the presence of "blue poison" in the arrows fired by the Mongols at the Maymun-Diz referred to black powder. "Blue poison, made up of particles", was one of the ways by which Mustawfi expressed black powder.

Keywords: Mongols, gunpowder, black powder, Maymun-Diz, siege, ballista, Hashashi/Hashashin, Hülegü

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Introduction

Since the end of the 10th century, China had begun to use gunpowder for military purposes in certain weapons (for instance, *huoqiang*, "fire spear"). Especially in the *Wujing Zongyao*, a Chinese military manual written in the 11th century, apart from many powder formulas, explosive bombs (*huopao*) are described with their visuals. In the 11th and 12th centuries, especially in the battles and sieges between the Jin Dynasty (1115–1234) and Song Dynasty (960–1279), the use of gunpowder weapons began to peak. The Mongols had the opportunity to see the power of this type of weapon closely in the North China campaigns that started with Chinggis Khan (from 1211). The Mongols quickly adapted to the first gunpowder weapons of history that developed in East Asia. From the Ögödei Ha'an (r. 1229–1241) Period, particularly in the Kublai Ha'an (r. 1264–1294) Period, they made extensive use of these weapons in their campaigns against the surrounding peoples. The most striking written information and archaeological finds regarding the use of black powder weapons by the Mongols relate to the Mongol Invasion of Japan in 1274 and 1281 [See: 39, p. 69–70; 6, p. 138].

Although the theory that Mongols used gunpowder weapons in East Asia by adapting them is generally accepted by historians, additional scholarly attention is needed to determine whether gunpowder was transported to the West by the Mongols and whether the Mongols used gunpowder weapons in the West. This problem is challenging to study because the terms in the historical sources refer to many different weapons and materials apart from their "basic" meanings. For instance, the term *naphtha*, which expresses petroleum-derived liquid, came to mean "black powder" from China in the second half of the 13th century because “black powder” was first used for incendiary purposes during sieges just like petroleum-derived liquid *naphtha* [See: 5, p. 1055–1056].

While Islamic *bārūd* originally meant saltpeter (nitrate compounds), it became a name denoting “black powder” during the Ottoman Empire and Mamluk wars (after the second half of the 15th century) due to the importance of saltpeter in gunpowder production. Some researchers, who do not compare the term *naphtha* in Persian sources, which is widely used in the context of Mongol expeditions, with Chinese sources, assume that the term *naphtha* referred to petroleum-derived liquid flammables by taking the term *mot a mot*. Nevertheless, comparisons with Chinese sources reveal that many Chinese generals, artisans, and military engineers were transported to the west by the Mongols since Chinggis Khan (r. 1206–1227).

In particular, Islamic sources state that Hülegü recruited many Chinese with their families and carried various Chinese weapons to the West with these Chinese artisans. The astonishment and admiration of the Islamic sources mentioning Hülegü's attack on the Hashashi/Hashashin castles (Mustawfi’s *Zafarnamah* or Juvayni’s *Tarikh-i Jahangushay*) at the Chinese armaments used by the Mongols, especially in the context of the siege of the Hashashi/Hashashin mountain fortress Maymun-Diz[1], provides evidence to support our suspicions. Through the comparison of Islamic sources that detail the weapons used by the Mongols in the Siege of Maymun-Diz and Chinese sources, our article suggests the potential use of Chinese rocket-assisted arrows and explosive bombs. We think that a clear portrait of the use of gunpowder in the West by the Mongols might be proven when the information provided by Chinese sources such as the Song military classic *Wujing Zongyao*, together with the works of the source writers Shīrāzī, Mustawfī, and Juvayni, is compared with the information about the development and use of gunpowder and various Chinese gunpowder weapons in China.

[1] Maymun-Diz Castle, although its exact location is disputed, was located on a steep mountain slope near Alamut Castle in Qazvin, Iran.

We have stated above that the issue of whether Hülegü brought gunpowder with him in the Middle East campaign and whether he used gunpowder weapons during this operation is a subject that divides researchers into two. For instance, Timothy May, one of the leading researchers on Mongolian history, has a strict stance on this issue. He states that the Mongols did not use gunpowder and gunpowder weapons in other places except for the military expeditions they carried out in East Asia [28, p. 146–149]. However, researchers such as Peter Jackson and Iqtidar Alam Khan are of the opposite opinion, and considering that various expressions in Persian sources point to this, they accept that the Mongols also used gunpowder in the Middle East [16, p. 89, 136–137; 21, p. 19]. As we shall see, contrary to Timothy May's skepticism, there are indeed essential signs and evidence that the Mongols utilized gunpowder weapons in the Middle East that they brought from China.

Weapons Carried by Hülegü from China to the Middle East

Hülegü was tasked with the conquest of the Middle East by his older brother Mungke Ha'an in August 1252. However, in February of the same year, Mungke Ha'an had previously sent Ket Buqa to the Hashashis' Girdqūh Castle [2, p. 20–21]. Hülegü left Mongolia in 1253 with an army of 70,000 people [19, p. 111]. When Mungke Ha'an sent Hülegü to complete the conquest of the Middle East, he had specially brought "catapult masters [استادان منجنیقی] and naphtha shooter people [نفط اندازان]" from China to head along with him. Juvayni adds that Chinese catapult operators, who amounted to 1,000 households, were brought [17, III, p. 92–93; 18, II, p. 608; See: 3, I, p. 419]. Khwandamir (Hāndmir) also states that Hülegü brought the "catapult masters" and "naphtha shooters" from China to 1,000 households [22, p. 53]. Shabankara'i elaborates and states that among the people who were brought from China, besides the catapult masters, there were also people who dealt with "crossbow/ballista [چرخ] and mangonels [عراده] and catapults [منجنیق]" [31, p. 261]. Hamdullah Mustawfi gives a different list. He remarks that Mungke Ha'an had told Hülegü that he could get whatever he wanted from all the means needed for sieges. Among these tools and specialists were "catapults and large bows [حر کمان], weapons of war [آلات کوشش] and naphtha throwers [نفط افکن] and crossbowmen [کماندار]" [32, I, f. 585B; 32, II, p. 15]. It is stated in some Islamic sources that there were also arrow-shooting types of catapults [11, p. 348]. Although such a design with classical catapults does not seem plausible, there were specimens in the Islamic world where the counterweight of catapults was used to throw the arrow of the ballista in the same machine [40, p. 110 et al.]. Therefore, we can conclude that the term *manjiniq* may have included such "ballistas with catapults". However, such a weapon is not found in Chinese sources. Rashiduddin, on the other hand, mentions that "*charḫ* thrower people [چرخ انداز]" besides "naphtha shooters" were brought from China by the Mongols. According to Kate Raphael, since the *charḫ* means "round object", the phrase "*charḫ* thrower people" denotes the crew that "traction-trebuchets", which the Mongols generally use, necessitated to launch round objects [36, p. 361]. In parallel, then, the phrase "naphtha shooter people", referred to the crew of the particular type "traction-trebuchet", which is called *huopao* in Chinese and that throws "fire bombs" with black powder. However, as revealed in the translations of Rashiduddin's passage, it is much more plausible that Rashiduddin refers to crossbowmen or "bolt-thrower men" with the phrase "*charḫ* thrower people" [37, II, p. 478; 38, III, p. 23]. *Charḫ* denoted a type of crossbow/ballista with a mechanism in Islamic sources [44, p. 156–157]. Therefore, it is more likely that the Chinese-style ballistas and the people who operated them are meant with this phrase. Together with Mustawfī's "large bow" phrase, such crossbow/ballista statements referred to Chinese-style ballistas, which are explicitly stated to have been used against Hashashi / Hashashin castles by the Mongols. As we shall see below, Shīrāzī names the "three-bow ballista" brought from

China and used against the Hashashi/Hashashin castles by the Mongols as *kamānhā-yi charḫ* (کمانها چرخ), that is, "bow with wheel mechanism" [42, p. 22; 41, p. 78]. Therefore, the term *charḫ* in these Islamic statements referred specifically to Chinese ballista and crossbows. On the other hand, Chinese artisans who were engaged in the "naphtha" launching (Persian *naft andāzān*) were the Chinese who knew black powder and operated catapults and ballistas to launch the black powder bombs.

Ballistas Brought from China to the Middle East by Hülegü and Data on the Employment of Rocket-Assisted Arrows in the Siege of Maymun-Diz Castle

Hülegü was reinforced with all kinds of war tools in his long march to Iran. As Mustawfī stated, "There was no end of arms and provisions of war" that Mungke gave to Hülegü [32, II, p. 17]. Therefore, Hülegü took gunpowder weapons from China with him, which shows that the term *naphtha* in Persian sources is once again a term denoting gunpowder combustibles. Many references to siege devices in the sources point to Chinese siege technology already serving the Mongol Empire. Until 1252–1253, the primary incendiary material used in China for centuries was gunpowder, which was already explosive. The fact that "naphtha shooters" were brought from China in addition to the catapult masters may indicate the *huopao* that we encountered in the Chinese expeditions. *Huopao* denoted both explosive bombs containing black powder, wrapped in soft (bamboo, paper) and hard (ceramic, iron) materials, and catapults that launched these bombs [4, p. 168]. The primary material we encounter during the wars in China is gunpowder instead of petroleum-derived naphtha. We think that this operation, which Hülegü embarked on by traveling a long way from Mongolia to the Middle East, is vital in terms of understanding the level of the Mongolian subsistence system, as well as the transition of gunpowder to the Islamic World or the widespread use of it in the Middle East.

Shīrāzī's work provides essential information regarding Chinese ballistas and gunpowder weapons. According to him, many men from Turkestan, China, and Transoxiana had joined Hülegü on his way to the Middle East. These artisans had brought countless pieces of equipment and weapons with them. He described one of these weapons as a type of crossbow or ballista that could draw three bows with a single beam. These three bows in the weapon fired arrows about one meter (1 *gaz*) long up to the tip. The "tip" part of the weapon, the arrowhead, was inserted into the arrow's notch, and the feathers extended from the notch to the tip of the arrow. In addition, the Mongols added the feathers of a vulture or eagle to the arrow shaft. Shīrāzī then mentions the manufacture of the arrow, stating that the arrow shaft was specially made of white poplar wood and then wrapped with horse or ox skin, as in the manufacture of a scabbard. According to Shīrāzī, five or seven arrows were tied together with a paste and placed on the ballista [41, p. 78–79]. The Mongols used weapons similar to these in the 2nd Battle of Hums/Homs in 1281 between the Ilkhanid ruler Abaqa (r. 1265–1282) and the Mamluk Sultan Qalawun (r. 1279–1290). It is recorded that these ballistas, which Sultan Qalawun captured from the Mongols when he returned to Damascus after the battle and brought with him in the Mongolian carriages, had three bows as described by Shīrāzī, as well as five cylinders and three perforated cylinders [30, p. 496–497][2].

[2] E. Blochet, in the same place [30, p. 497, 1n], explains the function of these cylinders as follows: "The cylinder on which the ropes were wound was a solid cylinder; this served to stretch the machine's triple bow. Segmented cylinders were cylinders with notches. These notches were attached to the ends of the levers, whose movement wrapped the ropes around solid cylinders".

Such ballistas, which Shīrāzī called *kamānhā-yi charḫ*, came from China and were made in China. Juvayni probably refers to the same weapon during the siege of Maymun-Diz, the Hashashi/Hashashin castle, like Shīrāzī; in this passage, Juvayni mentions the use of a weapon called "*kamān-i gāv* [کمان گاو]" (i.e., "ox bow") at the hands of the Mongols, manufactured by "Chinese masters". The range of these ballistas was "2500 *gām* [گام]" (i.e., "pace"). Juvayni states that many Hashashi/Hashashin soldiers in the castle were "burned" by "asteroid-like javelins" [سیارات تیر] fired by these ballistas and died by burning [17, III, p. 128; 18, II, p. 631; 13, p. 35]. This statement is very critical for our research. In that case, these ballistas were shooting "fire arrows", which we might think of as a kind of javelin or arrows carrying gunpowder charges and rocket tubes. After all, the fact that the arrow was wrapped in horse or ox skin, as Shīrāzī says, couldn't be for anything other than to protect the arrow shaft from fire. This passage refers to the "fire arrows" having been used for a long time in China, and the incendiary material for "fire arrows", as depicted in the 11th-century Song Dynasty's military classic *Wujing Zongyao*, was nothing but gunpowder. Two-bowed specimens of these ballistas are also depicted at *Wujing Zongyao* [49, 13.7a-13a]. In addition, this Chinese source explicitly states that the weapons called "three-bowed crossbow" 三弓床弩 were also named "eight-oxen crossbows" 八牛弩 and according to the source, "gunpowder" 火藥 could also be used for arrows fired by these weapons. In addition, in *Wujing Zongyao*, when referring to arrow production, wood and possibly iron-winged arrowheads are also mentioned in accordance with Shīrāzī's description [49, 13.7a-8a]. Therefore, the records of Juvayni and Shīrāzī substantially overlap with the information from the Chinese source. Juvayni's nomenclature "ox bow" clearly corresponds to the "eight-oxen crossbow" nomenclature in Chinese military classics [14, p. 458]. According to a Chinese work completed in 1200, at the end of the 11th century, the "nine-oxen crossbows", which were relatively light and easy to fire, were in use in China [13, p. 38]. Then the Mongols carried these Chinese ballistas to the Middle East. In support of this claim, Mustawfi states that the Mongols attacked the Maymun-Diz Castle with "Chinese arrows [خطا تیر]" [32, I, f. 591B; 32, II, p. 44][3]. The phrase "Chinese arrow" implies that the Mongolian-Chinese ballistas fired a type of arrow with a different technology than the usual arrows in the Islamic world. Especially in the Mamluk military literature that has survived from the second half of the 14th century, there are descriptions of rocket-assisted arrows or rockets called "Chinese arrows" (أسهم خطائية) [1, p. 3][4]. Hassan al-Rammah, who wrote his work in the 1280s, also names the rockets and rocket-assisted arrows he described with the visuals as "Chinese arrow" (سهم الحطای) [35, f. 75r]. It is also possible, as Haw quite logically puts it, that Juvayni's term "asteroid-like javelins", or "meteoric shafts", corresponds to the Chinese term *liuxing* 流星 ("meteor") for "rocket-assisted arrows" [13, p. 35–38]. In that case, we come across an important example of Chinese military technology and gunpowder weapons being carried to the West by the Mongols. As previously stated, the Chinese military classic *Wujing Zongyao* describes the use of gunpowder in the "eight-oxen crossbow". It remains to trace and compare the allusions to this weapon in Persian sources.

Timothy May maintains skepticism about the "burning of enemies" with these arrows and assumes that Juvayni incorporates a fancy and artistic expression into his text.

[3] The word "Hitay/Hitan" was a name given to the Liao Dynasty, founded by the Proto-Mongol Khitans who ruled northern China in the 11th and 12th centuries; later, it became a word expressing especially North China in many sources of the Period. Today, the Russians call China "Kitay" (Китай), a derivation from the word "Hitay/Hitan".

[4] For some depictions of such arrows, See: [34, p. 27].

According to him, even if the statement that the enemies were "burning" was true, the Chinese crew was not necessarily using gunpowder; old petroleum-derived naphtha must have been mentioned in this passage [28, p. 147]. This hypothesis is erroneous. Because Shīrāzī's record that the shaft was wrapped in skin definitively demonstrates that these were fire arrows. Moreover, describing the attacks on the Hashashi / Hashashin fortresses as thoroughly as possible, Mustawfī states that the Mongols had "fire arrowheads [پکان آتش]" and launched them to the peak where the Maymun-Diz Castle located on [32, I, f. 591B][5]. In these lines, in the mention of "fire arrows", Mustawfi uses the word "pêkân", possibly referring to the arrowheads of crossbows and ballistas, not the arrows of ordinary Mongolian composite bows[6]. It is possible to think of these arrows as javelins. Either way, historians other than Juvayni confirm that "fire arrows" were in question. Unlike May, Jackson does not question the authenticity of the passage in Juvayni's work in any way and asserts that "fire arrows" must have been launched from Chinese ballistas "evidently" and that the term *naphtha* in the sources referred to gunpowder [16, p. 136]. Haw goes much further than Jackson. According to Haw, Juvayni's record that the stones thrown by the Hashashis at the Mongols killed only one person signifies how backward these weapons were, technologically compared to the weapons used by the Mongols. In that case, the arrows fired from ballistas used by the Mongols were enough to burn more than one person to death. From this hypothesis, Haw argues that "gunpowder charges attached to them [arrows]" (possibly bombs) included explosive gunpowder [14, p. 458]. Similarly, Mustawfī also states that "Chinese arrows" were aimed at a specific target and "a number of that heretic army" died in each shot [32, II, p. 44]. However, when we look into Shīrāzī's record, each ballista shot more than one javelin/arrow. Then, many people would burn to death with a single ballista shot.

Interestingly, we find a record similar to Shīrāzī's record of binding arrows to each other in the context of three-bowed ballistas in *Wujing Zongyao*. It is mentioned in *Wujing Zongyao*'s passage that three-bowed ballistas could shoot many arrows simultaneously, due to the attachment to its beam of a kind of iron framework. When the Mongols launched these arrows, they shot dozens of people [49, 13.7b]. Nevertheless, multiple arrows might have also carried explosive charges of gunpowder on themselves. At this time, gunpowder had already reached an explosive character, at least from the 11th century. Therefore, it is much more logical that the gunpowder used was explosive. When looking into the rocket descriptions and visuals of Hassan al-Rammah (he calls rockets *sahm* سهم or *tayyār* طیار), he describes several arrow-shaped rockets connected, carrying both a powdered paper tube to launch the arrow and a bomb to set the enemy on fire. Al-Rammah even calls these rockets "Chinese arrows" (سهم الحطای) [35, f. 74r-75r; 12, p. 117–118]. Therefore, the incendiary or explosive gunpowder charge was probably placed just behind the arrowhead. When looking into the medieval arrow reconstructions of V.G. Kishchenko, charges were placed right behind the arrowhead, in which combustible materials such as gunpowder or oil were included. These "fire arrows" were 15–20 cm longer than regular arrows, and their overall length was 100–125 cm, similar to the measurement in Shīrāzī's record. The length of the arrowheads made of iron was 5.4 cm, and the length of the charge was 12 cm. The charge was covered with some kind of cloth [25, p. 50]. In this type of rocket-assisted arrows, according to depictions in Nicolle and Thompson's work on Medieval siege weapons, explosive or combustible bombs containing gunpowder were tied to the ar-

[5] In the English translation of the passage [32, II, p. 43], Ward translates the expression "pêkân-e atash" as "arrows carrying fire".

[6] The word "pêykân" meaning "arrowhead" in contemporary Persian, is derived from the Middle Persian word "pêkân" written without the "y" [46, p. 38, 79, 208].

rowhead. Based on these descriptions, perhaps similar to the sources' statements, two or three arrow shafts were brought together. The gunpowder charges were attached between the heads of these arrows or to the end of the shaft in the middle, and rocket tubes were also added [34, p. 27, 45].

It is not plausible that the Mongols, who had been making use of gunpowder in China at least since the wars between the Mongols in the Ögödei Period and the Jin Dynasty (the 1230s), came to the Middle East with a large number of Chinese they took with them and benefited from a substance other than gunpowder. Because the main flammable and explosive substance used militarily in China during this period was gunpowder. In addition, this type of Chinese-style, high-tech weapon (three-bowed ballista) fired by only naphtha could not provide the qualities required for the effects described in the sources. The Islamic source writers did not know what gunpowder was until at least the end of the 13th century (if Hassan al-Rammah is taken into account) or the middle of the 14th century, so they did not understand what provided the real power of these high-tech ballista arrows. During the time of Juvayni (d. 1283) and Mustawfī (d. 1340s), the Islamic world had just begun acquiring the gunpowder know-how. Although these scholars observed the qualities of gunpowder, they did not know its content. Apart from the death of many *mulahid*s (heretics) with a "single arrow," records of the "fire arrows", and the long-range that we shall see below, there is also other evidence of the use of gunpowder. According to Mustawfī, there was "poison" in the arrows fired by the Mongols from the ballistas. The weight of the “blue poison in the arrowheads” was more than 600 *deram* درم (“grain”) [32, I, f. 591B; 32, II, p. 44]. Writers of the Medieval Mongol Period, who did not know what gunpowder was and encountered this type of explosive material, called the gunpowder and black powder weapons "magic” or “poison". After speaking of the gas attack by the Mongols against the Poles at the Battle of Liegnitz (April 9, 1241), Jan Długosz states: “From their beginnings, the Tatars have always used the art and science of fortune-telling, divination, sorcery, and magic in wars and elsewhere (…)" [7, p. 22]. As Haw points out, Russian Archbishop Peter might had tried to refer to the poison gas bomb in Liegnitz or the gunpowder weapons the Mongols brought from China when he said that the Mongols had "iron and poisonous weapons" [14, p. 462–463]. Therefore, Mustawfi's description of "poison," which is not encountered in any other Persian sources when discussing the attacks of the Mongols on the Hashashi/Hashashin fortresses, must be an important piece of evidence pointing to gunpowder, according to our hypothesis. Another interesting clue that supports our analysis is that the unit of weight used by Mustawfī was *deram*, which is generally based on the number of grains in medieval Iran. The weight of 1 *deram* corresponded to the weight of approximately 48 barley grains, approximately 2 g or 0,071 oz [27, p. 459]. Therefore 600 *deram* is equal to 1,2 kg or 2,6 lb. The fact that Mustawfi used a unit of grain for the weight of the "poison" may indicate that the material called "poison" was composed of solid particles. This fact further increases the probability that these references were to black powder that consisted of small particles. Although Zhanhong You states that gunpowder consisting of small and equal particles with a high saltpeter ratio was first invented in the Song Dynasty Period, at the beginning of the 12th century, and the propulsive and explosive capacity of gunpowder increased [47, p. 656; 26, p. 19], the "corned powder" method of producing gunpowder was invented in Europe in the 15th century, despite some claims that it had existed in China for a long time [8, p. 94]. But even if China did not have this method, gunpowder itself consisted of sulfur, nitrate, and carbonaceous matter components, which were pounded together in a mortar and then sieved into even and very fine particles similar to flour, as recorded in the *Wujing Zongyao* [33, p. 120]. In other words, it

was the grains, and this fact fits perfectly with the unit *deram* ("grain") used by Mustawfī. Since Mustawfi was unlikely to have seen such a gunpowder arrow with his own eyes, he must have heard about "poison" from someone who had witnessed the arrows being fired by the Mongols. It was not possible for Mustawfi and his informants to personally measured a weight of 1.2 kg for liquid poison. Eyewitnesses who saw the black powder particles and black powder charges placed on the arrowheads or shafts by Mongols must have told Mustawfi about this situation as "poison" and measured the particles with an approximate value. It is normal that gunpowder weighing more than 1,2 kg was used in explosive charges of the arrows fired by the strongest ballistas of China. The weight of the explosive gunpowder used in bamboo "thundercrash bombs [or balls]" 霹靂火球 was 3 or 4 *jin* (about 1,5 or 2 kg) according to the Song military classic [49, 12.70a]. Therefore, if our hypothesis is correct, the weights of Mustawfi and Song military classic match. Another reason the gunpowder used in these early explosive bombs was quite heavy was the lack of air space between the small and fine powder particles, thereby delaying the explosion. The amount of gunpowder was increased to prevent detonation delay [8, p. 94]. Presumably, Mustawfī referred to the amount of gunpowder in the ceramic, bamboo, or perhaps metal bombs attached to the arrows launched by the Chinese three-bowed ballistas.

Records on the Range of the Chinese Ballistas Used by Hülegü in the Siege of Maymun-Diz Castle and Rocket-Assisted Arrows

Juvayni and also Mustawfi's records of the weapon's range, besides propounding that the three-bowed ballista had advanced technology, open the door to another assumption. According to Herbert Franke, these Chinese-style ballistas were installed with a spiral wheel, and the number of people required to launch could be up to 100 for the three-bowed types. Franke calculates the 300 *bu* 步 ("pace") range of three-bowed ballistas in Chinese sources as approximately 183 m [9, p. 166]. However, Franke's calculation is wrong, and he underestimates the value of the Chinese unit. By the 11th century, the range of the ballistas used in China had increased to 1000 "paces", or about 1,500 m, through experiments [13, p. 37]. Juvayni, on the other hand, states "2500 *gām*" ("pace"), as we have noted. Apart from Juvayni, Mustawfī records the range of the ballista from which the "Chinese arrows" were launched at the Maymun-Diz Castle as "half a parasang" [32, I, f. 591B; 32, II, p. 44], which is close to 2 or 3 km[7]. The excessive quantities and data reported by Mustawfi and Juvayni also suggest that the range of Mongolian-Chinese ballistas was extraordinarily long. John Andrew Boyle's translation of "pace" for the unit *gām* would also clearly yield a very exaggerated range. John Masson Smith states that even if the unit *gām* is taken as "foot" (30,40 cm) instead of "pace," a range of half a mile (800 m) would be reached, and a ballista with this range is not recorded in the sources. According to Smith, either it was an exaggeration of Juvayni, or there was a gunpowder-fired rocket. He concludes that explosive powder might have been used to launch arrows or javelins from ballistas. He assumes that when the 420 m range of the ballistas, which were drawn with the help of a crane (or lever), was added to the range of 400–500 m of the arrow with the rocket tube loaded with gunpowder, a minimum range of 800–900 m of Juvayni could be reached. Therefore, according to Smith, these ballistas could have shot arrows using both the shooting force of their bows and the propelling power of explosive powder in the rocket tube [43, p. 126–128]. This hypothesis seems to be the most likely and logical explanation. However, Smith does not detail how the ve-

[7] However, David Morgan, based on Yāqūt al-Hamawi's work called *Mu'jam ul-Buldān*, equates 1 *farsang* to 3 miles (4.8 km) [29, p. 382]. 1 *farsang* could be about 8.5 or 9.5 km in some periods [15, p. 120]. On the variation of *farsang* according to periods and regions, See: [15].

locity might have been kept constant after the rocket tube was attached to the arrow. Haw, almost like Smith, states that such a range could only be achieved with "rocket-assisted arrows". According to Haw, the range given in the sources could have been reached when the bow power of the Chinese ballista was added to the propelling power of the rocket tube attached to the arrow itself. The fuse length in the rocket was the only way to achieve such a range. The fuse length was adjusted and ignited, and then the arrow was shot from the ballista toward the Maymun-Diz Castle. As the arrow (or multiple arrows) made its way through the air toward the castle, the fuse would run out, and the fire would ignite the gunpowder in the rocket tube. Before the arrow would begin to descend, the gunpowder that was in the rocket tube attached to the arrow would be ignited. This allowed the arrow to acquire additional propulsive energy. According to Haw, the presence of the fuse allowed the rocket to be fired in mid-air; if the gunpowder in the rocket tube had been ignited without a fuse before the arrow was launched from the ballista, the flame it emitted from behind could have burned the crossbowman. Haw calls these weapons "rocket-assisted arrows" and states they were the intermediate stage between "fire arrows" and primitive Chinese missiles [13, p. 35–36][8]. It seems clear that the only way to reach such a range, recorded by Mustawfī and Juvayni, is rocket support. The reason why Shīrāzī, who narrated the most detailed description of the ballista, did not mention the fuse might be that the fuse was exhausted in the air and had already turned to ashes when the arrow fell to the ground. The three-bowed ballista, which has visuals in the Song military classic *Wujing Zongyao*, is also depicted with a fuse. In addition, there are many references to a fuse in works depicting Chinese bows and arrows. The primary evidence for employing the rocket/missile as a self-propelled weapon appears in the second half of the 13th century. Its inadequacy as a self-propelled weapon is generally attributed to its uncertainty in hitting the target and the excess deviation rate from the target. However, "rocket-assisted arrows" would have deviated less from the target and hit the target much more precisely since the ballistas launched them. Using long-range weapons must have been vital in the attacks on the Maymun-Diz Castle and other Hashashi/Hashashin fortresses because these castles on the mountain slopes were located very high. For an effective attack, explosive or incendiary weapons capable of shooting at long distances must have been needed. The gunpowder used in the rocket was explosive powder with a high potassium nitrate content. As we mentioned above, the records narrating that many people died with a single arrow and Mustawfī's record of "poison" might refer to charges containing explosive gunpowder attached to the arrow shaft or arrowhead. Unfortunately, we do not have precise information about this charge. A gunpowder charge might have been attached to the arrowhead or the shaft using paper or cloth. However, ceramic vessels filled with explosive gunpowder were perhaps attached to the arrow shaft.

In any case, the steep castles of the Hashashis, considered inaccessible for centuries, were captured by the Mongols, mainly thanks to the superiority of Chinese siege technology. As Juvayni said, "having that day experienced the force of the Mongols' arms," those in the Maymun-Diz castle gave up defending and surrendered [18, II, p. 631]. In our opinion, a ballista, its Chinese crew, and gunpowder invented by the Chinese were in the Siege of Maymun-Diz. Iqtidar Alam Khan, on the other hand, equates the siege weapon "ox bow" in Juvayni's passage with the *huopao* catapults, which the Mongols had already used in China for several decades [20, p. 38]. However, when considered in the context of Shīrāzī's record, it is now certain that a Chinese style ballista shot "fire arrows." Nevertheless, Chinese catapults were also used in addition to these ballistas in

[8] John Masson Smith also assumes that such an intermediate stage must have existed [43, p. 128].

the siege of Maymun-Diz. Since Hülegü had this type of Chinese ballistas in his possession, the weapons *baban* (բաբան in Classical Armenian), which were operated by the Mongols during the long siege of Silvan (Meyafarikin in Diyarbakır Turkey, captured in 1260) must have also been of Chinese ballistas used in the siege of Maymun-Diz [24, p. 385][9]. However, there are no other explicit references to these weapons called "ox bow" (Chinese "eight [or nine]-oxen bow"), apart from the siege of Maymun-Diz Castle. According to Smith [43, p. 128], the reason for this fact was the relative unreliability of the rocket-assisted arrow in terms of hitting the target. Additionally, places like Maymun-Diz Castle, on steep mountain slopes, were no longer in front of the Mongols. The ballista's range was sufficient in attacks on ground-level fortresses such as Baghdad. Even if the rocket support had been removed in attacks on such places, it is not possible that the Mongols would give up the "fire arrows." Among the many incendiary weapons recorded by Islamic sources as "naphtha tools", there might have also been Chinese-style triple-bowed ballistas that shot "fire arrows."

Conclusion

By comparing Persian and Chinese sources, we tried to reveal more clearly and accurately what kind of weapons Hülegü used in the Hashashi/Hashashin Maymun-Diz Castle. Most Islamic sources mainly state that Hülegü advanced very slowly from Mongolia to the Middle East and obtained all kinds of weapons, capable of annihilating the Hashashis/Hashashin and capturing Baghdad, from his elder brother (the ruler Mungke Ha'an). Among these weapons that Hülegü brought from East Asia to the Middle East, the most crucial emphasis was on Chinese weapons. Our sources state that Hülegü brought all kinds of weapons from China and, along with these weapons, the necessary food supplies. Therefore, it would be unreasonable to think that the gunpowder weapons used by the Mongols since at least the Ugedei Period were not carried west by Hülegü. During this period, gunpowder acquired new visibility in the Islamic world. Since the flammable feature of gunpowder came to the fore initially, gunpowder was mentioned in sources with a general nomenclature, *naphtha*. Persian sources unanimously emphasize that Hülegü used Chinese bows that fired burning arrows, especially during the Siege of Maymun-Diz, and that there were many Chinese artisans with him. Besides this emphasis, Chinese weapons used by Hülegü had extraordinary power from the viewpoint of Islamic sources. Many castles had to surrender thanks to these weapons. In addition to the data about the excessive length of its range, the fact that many heretics are said to have died in the face of explosive arrows sent from ballistas are effects that petroleum-derived liquid *naphtha* could not have created. Especially in Hassan al-Rammah's (d. 1295) military book (*Kitab Al-Furusiyya wa Al-Manasib Al-Harbiyya*), these weapons described under the name "Chinese arrows" were rocket-assisted arrows launched from Chinese ballistas with wheels. After these arrows were launched from Chinese ballistas, the gunpowder in the tube attached to it was ignited by the fuse and the arrow attained an extra range. Apart from the rocket tube, these arrows also carried ceramic or iron-clad gunpowder bombs. The mountain fortresses of the Hashashis were located in very steep positions. The drawback that the Hashashi/Hashashin castles were far from the siege field was compensated through rocket support. The gunpowder bombs were transported into the fortress by means of rocket-assisted arrows, and these bombs exploded in the castle, thereby killing many

[9] In the work of Kiragos Gandzaketsi, these weapons, which are stated to be used by the Mongols apart from the catapults, are rendered as "taran" in the Russian translation [10, p. 232]. Robert Bedrosian translates it as "ballista" [23, p. 321]. Since Gandzaketsi generally uses the term *pilikvan* (փիլիկվան) for catapults, the term *baban* must have referred to different types of catapults or ballistas.

enemy soldiers with shrapnel and fire rain. One of the original hypotheses of our article regarding the use of gunpowder is the evaluation of Mustawfi's data that "blue poison" was applied to the tips of arrows. It is critical for us that he noted that this poison was composed of particles. Additionally, the weight he noted for poison coincides with the weight of gunpowder used in bombs in Song China. Therefore, "big bows" or "ballistas," which were said to have been brought from China, were firing rocket-assisted arrows carrying explosive gunpowder charges. If this hypothesis is accepted, the information stated by Mustawfi that "Chinese bows" and "naphtha vessels" were used in the Siege of Baghdad by the Mongols in 1258 [32, II, p. 104; 45, I, p. 67, 70] should be re-evaluated in the context of Chinese weapons and gunpowder.

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ИССЛЕДОВАНИЕ ПОРОХОВОГО ОРУЖИЯ, ИСПОЛЬЗОВАННОГО ХУЛАГУ В БЛИЖНЕВОСТОЧНОЙ КАМПАНИИ

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Цели исследования: Установить, привозил ли Хулагу порох из Китая во время своей военной операции на Ближнем Востоке в 1256–1260 гг. и применяла ли его армия пороховое оружие против крепостей ассасинов Аламута.

Материалы исследования: Автор статьи исследует иламские и китайские источники, в которых упоминается военный поход Хулагу из Монголии на Ближний Восток и вооружение монгольской армии.

Результаты и научная новизна: Большинство исследователей сходятся во мнении, что монголы использовали пороховое оружие, адаптированное из Китая, в своих восточноазиатских военных экспедициях, таких как Китай, Япония, Корея и Ява. Однако до сих пор ведутся споры о том, использовали ли монголы порох и пороховое оружие в своих военных походах на Запад. Некоторые исследователи утверждают, что монголы не использовали порох в европейской кампании и что нафта была основным зажигательным материалом, которое они использовали в ближневосточном походе.

Авторы исламских источников описывали новое китайское оружие и химикаты в более привычных терминах, таких как нафта. Особенно если сравнить сведения Хамдаллаха Муставфи, Ата-Малика Джувайни и Кутб ад-дина Ширази об осаде монголами Маймун-Диза в 1256 г. с китайским военным уставом «Уцзин Цзунъяо», становится очевидным, что монголы перевозили трелучные баллисты под названием «бычий арбалет» из Китая. Получается, что данные баллисты стреляли «стрелами с ракетной поддержкой». Эти стрелы несли бумажные трубки, наполненные порохом, что увеличило бы их дальность до достижения горной крепости Маймун-Диз, и бомбы, покрытые бумагой, бамбуком, керамикой или металлом, которые подожгли бы защитников крепости. Эти баллисты упоминаются как *бабан*ы в армянских источниках и как «нафтовые инструменты» во время осады Багдада монголами. Наиболее оригинальным аспектом нашей статьи является гипотеза о том, что сведения в работе Муставфи о наличии «голубого яда» в стрелах, выпущенных монголами по замку Маймун-Диз, относятся к черному пороху. «Голубой яд», состоящий из частиц, был одним из способов, которыми Муставфи выделял черный порох.

Ключевые слова: монголы, порох, черный порох, Маймун-Диз, осада, баллиста, ассасины, Хулагу

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