

# The Spread of the Iron Stirrup along the Silk Road

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The term ‘Silk Road’ is interpreted in most cases as land routes that existed before AD 1500, connecting China and Central Eurasia with India, the Middle East and Europe. Not only luxury and common goods, but also technologies, religions, ideas, languages and arts spread in both directions, and peoples migrated to different regions of Afro-Eurasia. The newly introduced technologies became common features of the whole Afro-Eurasian world, and included the manufacturing of silk, papermaking and glassblowing. The decisive steps in Eurasia’s military history were the introduction of heavy armoured cavalry and firearms, which were based on the innovative use of iron stirrups and gunpowder, respectively.

The focus of this paper is on the iron stirrup, which spread under the rule of the Türk Khaganate (6<sup>th</sup> – 8<sup>th</sup> cc.), together with two other innovations: the sabre and yurts. The Türk Khaganate was founded in the middle of the 6<sup>th</sup> century and controlled the steppe-belt from Manchuria to the Crimea; it also maintained close relations with China, Sassanid Persia and Byzantium, which enabled the spread of these innovations (Stark 2008).

The use of the iron stirrup had a decisive effect on the development of warfare. It was invented as a result of the nomadic Chinese peoples’ cooperation in north China in the 4<sup>th</sup>–5<sup>th</sup> centuries. From there it spread to the east (Korea, Japan) and to the west, through the Avar and Türk Khaganates and the Silk Road to Sogdiana, Persia; and then to the Caliphate, Byzantium and Europe. To study this process, it is necessary to take into account the results of language history, the first documentations in written sources, early pictorial representations, and archaeological finds, in order to obtain a comprehensive overview.

Three basic opinions have been formed regarding the origin of the stirrup: Pelliot noted that the nomads from Inner Asia invented the stirrup and taught their tricks of riding to the Chinese. The ‘real’ stirrup came from Inner Asia to China between AD 200 and 400 (Pelliot 1925-1926: 259–262). Albert von Le Coq (1860–1930) suggested that the stirrup may have originated either from Turkic-speaking nomads, or from the Chinese in order to successfully confront the nomadic cavalry (Le Coq 1925: 22). Recently, David A. Graff has pointed out that East Asian early medieval military technology was a product of cooperation between the Chinese and the steppe

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nomads. The contact between settled peoples and nomads took place in north China, where steppe dynasties gained power (Graff 2016: 141).

David A. Graff emphasized the historical significance of the stirrup in his work on the military history of medieval China, published in 2002. The Han army was recruited from the peasantry, but from 300 AD onwards, a new military-caste cavalry started to appear, whose main characteristic was the use of the iron stirrup, and armour covering the horse and the rider. This process started around 300 AD, which roughly coincides with the appearance of the stirrup in China; while its end is AD 900, which is the date of the introduction of gunpowder into Chinese military technology (Graff 2002: 11, 17, 41–43).

Pipes, in a monograph, discussed the emergence and survival of Muslim military slavery and its institutional system; he stated that Islam may have played a significant role in its formation. In addition, three other factors have to be considered: climatic conditions, the migration of the Turks, and the appearance of the iron stirrup. The significance of the stirrup was that its application allowed the stallion-rich nomads to gain military superiority over settled and densely populated areas, which could be compensated by various strategies. In Islamic territories, this dilemma was solved by inviting nomadic Turks to join the Caliphate's army. However, this concept is also debated (Pipes 1981: 55–58).

According to Luttwark, the cavalry became a decisive force in the Eastern Roman empire, due to the appearance of the Huns. The use of the stirrup was adopted from the Avars, and made the Byzantine cavalry more effective (Luttwark 2009: 59, 275–277).

In his book published in 1962, White studied the spread of the stirrup in Europe. He suggested that knighthood was the basis of the emergence of European feudalism, and that the stirrup was indispensable to their fighting style (White 1962: 1–38). This provoked a debate which suggested that the relationship between the use of the iron stirrup and feudalism was much more nuanced, as the stirrup was not in general use in the Carolingian period, and knighthood became prevalent in the 12<sup>th</sup> century in Europe (Dibon-Smith 2017: 103–110). However, there is a consensus regarding the Avars' role in introducing the iron stirrup into Europe (Csiky 2015: 392–393; Pintér-Nagy 2017: 120–121, n 336; Bivar 1955: 61–65).

The representatives of Altaic theory have been interested in the adaptation of the iron stirrup from the viewpoint of language history. Gombocz assumed that the common Turkic *üzengi*, Chuvash *yārana* and Mongolian *dörüge* (meaning 'stirrup') are related, coming from a common Altaic form (Gombocz 1912: 5). Poppe and Ramstedt reconstructed the Proto-Turkic *\*yüzäjü*, from which the Altaic form *\*δ'ürängi* can be reconstructed (Ramstedt 1916: 74; Poppe 1958: 93–97). Doerfer and Róna-Tas refused to accept this assumption, because the Mongolian form *dörüge(n)* is derived from *dörü* 'nose ring from iron or rope', and the Proto-Turkic reconstruction is *\*iräjä*, from which all the Old Turkic and the Old Chuvash forms can be properly explained (Doerfer 1965: 148–149; Róna-Tas 1972: 169–71). The present Chuvash *yārana* with *y*-prothesis is a well-known change justified by other parallels in

Chuvash. The common Turkic reflects two prototypes: *\*üzəŋgü* in the Oguz, Kipchak and Turki language groups, and *\*izeŋge* in Siberian Turkic languages (Baraba, Khakass, Tuvay, Yakut, Yellow Uyghur) (Róna-Tas 1982: 120–122). The Chuvash form shows similarities with the Turkic languages spoken in Siberia. In any case, the stirrup belonged to the common vocabulary of the Turkic languages, before the Chuvash-type Turkic and the Common Turkic languages were separated. Therefore, the invention and spread of the stirrup can provide a chronological framework for Turkic language history as well.

Altaic: *\*δ'ürāŋgi* > Proto-Turkic *\*yüzāŋü* > Mongol: *dörüge*

Old Turkic: *\*üzəŋgü* - Oguz, Kipchak and Turki languages

Old Turkic: *\*izeŋge* - Modern Siberian Turkic languages

Old Chuvash: *\*irāŋä* > Chuvash: *yărana*

The etymology of the word ‘stirrup’ in different languages may provide a basis for the innovation, development and use of stirrups. According to Pelliot, the Chinese 鐙 *Dèng* ‘stirrup’ was composed of the key meaning ‘metal’ and 登 *Dēng* ‘to mount’. He quoted the German *Steigbügel* ‘stirrup’ as an analogy, which is a compound of *steigen* ‘to mount’ and *Bügel* ‘handle’. The Turkic *üzəŋgü* is a derivative from *üze* ‘on’. The Arabic word ركب *rikāb* ‘stirrup’ can be derived from the verb ركب *rakiba* ‘to mount; to ride’ (Pelliot 1925–1926: 261–262). Hayashi suggested that the iron stirrup developed from leather footrests. This process may be reflected in the Anglo-Saxon *stigrap*, which is the composition of *stigan* ‘to mount’ and *rap* ‘rope’ (Hayashi 1995: 69). The French word *ether*, Spanish *estribo*, Italian *staffa* and Russian *stremya* (meaning ‘stirrup’) may have been derived from a common word ‘rope, strap’, which may have referred to an object that helps to mount a horse (Kyzlasov 1973: 31–34). The Greek σκαλα ‘stirrup’ is from the Latin *scala* ‘staircase’ (Szádeczky-Kardoss 1986: 208). The meaning of the Hungarian *kengyel* ‘stirrup’ is ‘a device that supports the foot when mounting and riding a horse’, which was formed from a version of the *kégy* ‘circle, hoop, ring, tire’ plus the suffix *-l* (TESZ II: 443). The Mongol *dörüge* ‘stirrup’ is semantically an interesting parallel, as the Mongol word is *dörö* ‘iron hoop’ plus the suffix *-ge(n)* (Nugteren 2011: 319).

The stirrup was first mentioned in Chinese sources.<sup>1</sup> Pelliot noted that the first datum is from Zhang Jing'er's (†483) biography, which can be dated to 477: “(Zhang) Jing'er and Liu Rangbing, the senior officer of (Shen) Youzhi, were good friends. When Cangwu fell, (Zhang) Jing'er suspected that (Shen) Youzhi is launching a war on this. (So) he secretly inquired (Liu) Rangbing, who did not say a word, he sent only

1 I express my thanks to Professor Gábor Kósa sinologist who translated and helped me to interpret the Chinese texts.

a pair of horse stirrups to (Zhang) Jing'er, who then made the preparations."<sup>2</sup> The dispatch of stirrups was a signal to start the military action.

Boodberg found earlier data on the stirrup, in the biography of Wang Luan from 399: "In the 3rd year of Long'an period [of the Eastern Jin] [399], in the 1st year of the Changle period of the (Late) Yan state [399], in the 1st year of Hongshi period of the (Late) Qin state, (399) and in the first year of Xianning period of the ruler Lüzuan of the (Late) Liang period (399), Murong De [336–405] from South Yan recruited soldiers in Qingzhou. Among the recruits from Yan was Donglai's chief, Wang Luan. Luan was 9 feet [approx. 2.7 m] high, at his waist the belt was 10 *wei* [approx. 2 m long] and [he] was able to mount his horse in armour without need of grasping the saddle or using a stirrup."<sup>3</sup> This unusually strong man did not need the help of stirrups to mount a horse. Thus, the Chinese chroniclers recorded the use of the stirrup in the 5<sup>th</sup> century.

The military manual *Strategikon*, preserved under the name of the Byzantine Emperor Maurice, gives a detailed account of the Turk-Avar nomadic military tactics and weapons. The work is usually dated to 600. It is noted in connection with the Byzantine cavalry: "attached to the saddle should be two iron stirrups." (Dennis – Gamilscheg 1981: 80–81). According to Szádeczky-Kardoss, the Avar origin of the stirrup cannot be questioned, since the author refers to the Avars in the preceding and following passages on the breast plate and tunics. The lack of a mention that the stirrup is of Avar origin can be explained by stylistic reasons. The Greek σκαλα 'stairs, stirrup' is a loanword from the Latin *scala*. The stirrup is mentioned in a description of the health section of the Byzantine army, where it is said that the usual location of the stirrup is at the front of the saddle; but there is also a stirrup at the back of the saddle of the sanitary horses, for taking the wounded out of the battlefield (Szádeczky-Kardoss 1986: 208–211).

The earliest mentions of the stirrup in the Muslim *hadīth*-literature are in connection with the Prophet Muḥammad. Abū Dāwūd († 888) stated: "I saw the Messenger of God preaching to the people on 9 Dhul-Hijjah on a camel standing in the stirrups (ركاب *rikāb*)."<sup>4</sup> Whereas the *Saḥīḥ Muslim* collection from the 9<sup>th</sup> century

2 Li Danshou 李延壽 (ed.): *Nan Qi shu* 南齊書 (Tang dynasty), *juan* 25, p. 466: 敬兒與攸之司馬劉攘兵情款，及蒼梧廢，敬兒疑攸之當因此起兵，密以問攘兵，攘兵無所言，寄敬兒馬鏡一隻，敬兒乃為之備。The same text can be found in Xiao Zixian's 蕭子顯 (ed.) *Nanshi* 南史 (Liang dynasty), *juan* 45, p. 1137; a slightly different version was recorded in the *Zizhi tongjian* 資治通鑑, *juan* 134. Cf. Pelliot 1925–1926: 259.

3 *Sanshi guo chungiu* [jiben] 三十國春秋[輯本] (*Taiping yulan* 377): 隆安三年，燕長樂元年，秦弘始元年，涼呂纂咸寧元年，南燕慕容德傳檄青州。燕徵其東萊太守王鸞。鸞身長九尺，腰帶十圍，貫甲跨馬，不據鞍由鏡。*Sanshiguo chungiu* 三十國春秋 was compiled by Xiao Fangdeng 蕭方等 [528–549], it was lost, and it was preserved in a later source. The current version was compiled by Tang Qiu 湯球 of the Qing dynasty from *Taiping yulan* 太平御覽, an encyclopaedia from the 10th century. The report has two other versions: *Yanzhou sibu gao* 兗州四部稿 (四庫全書本)/全覽 6 and *Yuding yuanjian leihan* 御定淵鑑類函 (四庫全書本)/卷 256. Cf. Boodberg 1979: 112.

4 Sunan Abū Dāwūd 1917 <https://sunnah.com/search/?q=stirrup> (accessed 08.10. 2018).

recorded: “When the Prophet put his feet in the stirrup (*garz*) and the she-camel got up carrying him...”<sup>5</sup> There is another datum in the description of the Battle of Hunan (630): “Abu Sufyan was holding the stirrup (ركاب *rikāb*) of the mule of the Messenger of God.”<sup>6</sup> Lane clarified in his dictionary that *garz* means a leather stirrup attached to a camel’s saddle, while *rikāb* is a stirrup made of iron, copper or wood (Lane 1863–1893: 2246). The collections of Abū Dāwūd and at-Tirmidhī († 893) preserved a report about Ali from 661: “Ali ibn Rabi’ah said: I was present with Ali while a beast was brought to him to ride. When he put his foot in the stirrup (ركاب *rikāb*), he said: ‘In the name of God’.”<sup>7</sup> These reports can be dated to the middle of the 7<sup>th</sup> century, but they were recorded in the 9<sup>th</sup> century. Consequently, the use of the iron stirrup at the time of the Prophet is dubious, since the appearance of the iron stirrups in other Muslim literary sources can be dated to the end of the 7<sup>th</sup> century.

Al-Ġāhiz († 868) was a renowned Mutazilite scholar of the 9<sup>th</sup> century; he was the author of numerous literary works, among others, *Exploits of the Turks and the Army of the Khalifate in General*. He mentioned that the people of Khorasan, living in the eastern province of Persia, played a decisive role in seizing the power of the Abbasid dynasty in the Caliphate. They stated: “And we make armour of felt and have stirrups and breastplates.” (Walker 1915: 646). The geographer al-Muqaddasī listed stirrups among the goods exported from Samarkand in the 10<sup>th</sup> century (BGA III: 325; Barthold 1928<sup>2</sup>: 235). Al-Ġāhiz twice mentioned the stirrups of the Arabs in another work, *Kitāb al-bayān wa’l-tabyīn* (The Book of Eloquence and Demonstration): “You were accustomed to ride your horses in battle bareback, and whenever a horse did not have a saddle on its back it was made of leather but had no stirrups. But stirrups are among the best trappings of war for both the lancer who wields his spear and the swordsman who brandishes his sword, since they may stand in them or use them as support.”<sup>8</sup> “As to stirrups, it is agreed that they are very old, but iron stirrups were not used by the Arabs before the days of the Azraqites.”<sup>9</sup> This is supplemented by a description of al-Mubarrad († 898) from *Kitāb al-kāmil fī’l-adab* (The Book of Perfection in Education): “Stirrups were first made of wood and therefore broke very easily, with the result that whenever (the warrior) wished to brandish his sword or the lancer to strike with his spear, he had no support. Consequently al-Muhallab ordered that they be made of iron. He thus became the first to have stirrups made of iron.” (Wright 1864: 675). The background of the story was the campaigns of the Arab leader al-Muhallab (632–702) against the most prominent Harījite branch, the Azraqites, in the 690s (P. Crone: EI<sup>2</sup> VII, 357; R. Rubinacci: EI<sup>2</sup> I, 810–811).

5 Saḥīḥ Muslim 1187 c <https://sunnah.com/search/?q=stirrup> (accessed 08.10. 2018).

6 Saḥīḥ Muslim 1775 a <https://sunnah.com/search/?q=stirrup> (accessed 08.10. 2018).

7 Jami’ at-Tirmidhī 3446; Sunan Abū Dāwūd 2602. <https://sunnah.com/search/?q=stirrup> (accessed 08.10. 2018).

8 Ġāhiz, *Kitāb al-Bayān wa’l-Tabyīn*. <http://www.islamicbook.ws/adab/albian-waltbiin-.pdf> 278 (accessed 08.10. 2018).

9 Ġāhiz, *Kitāb al-Bayān wa’l-Tabyīn*, <http://www.islamicbook.ws/adab/albian-waltbiin-.pdf> 280 (accessed 08.10. 2018).

In summary, the stirrups were first recorded in Chinese sources in 399 and in 477; Byzantine military history mentioned the stirrups at around 600; while the Muslim authors dated the appearance of iron stirrups to the 690s.

The visual representations of stirrups appeared first in Chinese paintings and sculptures. There is a statue of a horse from around Nanjing dated to circa 322, which shows stirrups on each side of it. Chavannes called attention to a Chinese relief from 554, showing a rectangular stirrup (Dien 1986: 45, n.30). The mausoleum of the famous Tang emperor, Taizong (626–649), who subjugated the Eastern Türk Khaganate in 630, contains a harnessed war stallion with stirrups depicted on his tombstone (Zhou 2009: 202–209).



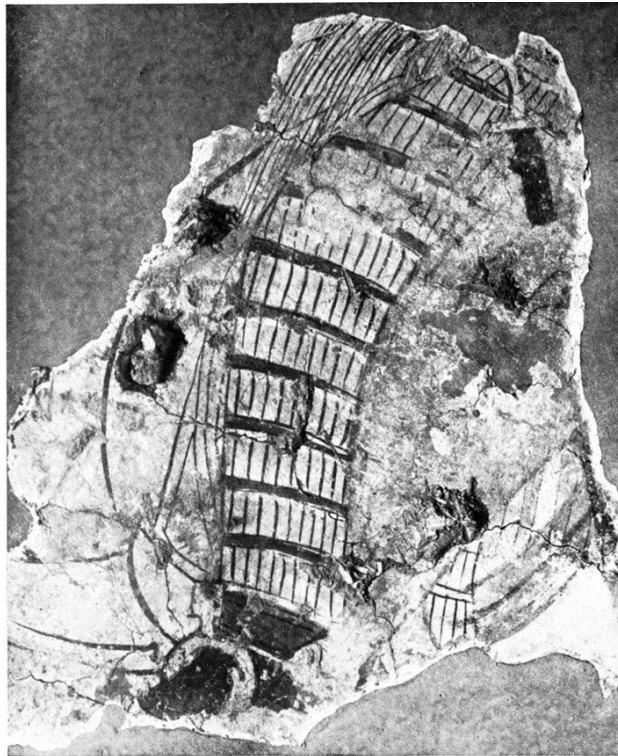
Finally, there is a stirrup on a horse drawing from the mid-8<sup>th</sup> century by the famous Tang-era painter, Han Gan (706–783).<sup>10</sup>



In Korea, there are visual representations from the kingdoms of Kogurjo and Silla. Mjongjong's tomb from the first half of the 5<sup>th</sup> century is located near Ji'an city, where the famous hunting scene with stirrups can be seen on the wall of the main chamber. This is one of the most beautiful mural paintings of the Kogurjo kingdom. A stirrup can be identified on the equestrian statue among the ceramic figures in the tomb of the Golden Bell, from the 5<sup>th</sup> – 6<sup>th</sup> centuries, in the territory of the Kingdom of Silla; and another appears on a clay sculpture in the Gyeongju Museum (Dien 1986: 35).

Turning to the west of China, there is a fragment with armoured horse's leg and a stirrup in a mural painting in Kocho in the Tarim Basin, from the 9<sup>th</sup> century (Le Coq 1925: 76).

<sup>10</sup> <http://www.chinaonlinemuseum.com/painting-han-gan-two-horses.php> (accessed 08.10. 2018).



There are also stirrup representations in the mural paintings of Penjikent from Sogdia, in the territory of present-day Uzbekistan (Azarpay 1981: 124, figure 50, plate 6–7, 8–9, 14, 15, 17; Marshak 2016). The picture of the Rustem's story in the blue hall clearly shows the stirrup; this picture is dated to the first half of the 8<sup>th</sup> century.





Furthermore, a hunting scene with a Middle Persian inscription on a silver plate can be dated to the 8<sup>th</sup> century. It was made in the territory of Khorasan and it is considered to be a post-Sasanian work of art; it shows the rider putting his foot into a stirrup.<sup>11</sup>



In Islamic lands, there is a floor painting with a hunting scene in the palace of Qasr al-Hayr al-Gharbi in Syria, built between 724 and 743 by the order of the Umayyad caliph Hishām. In this scene, the stirrup of the rider is visible (Fehérvári 1987: 46, 297).

11 Dish with hunting scene. 8th c. Silver. Dia. 28.3 cm. Middle Iranian inscr Found before 1835; purch. 1840. Inv. no. S-247Pub.: Smirnov no. 61; Trever & Lukonin no. 17; Darkevich no. 115, pl. 2, pp. 57-59 (doubts Sasanian, but suggests Khorosan, end 7th-beg. 8th c.)” <https://depts.washington.edu/silkroad/museums/shm/shmsasanian.html> (accessed 08.10. 2018).



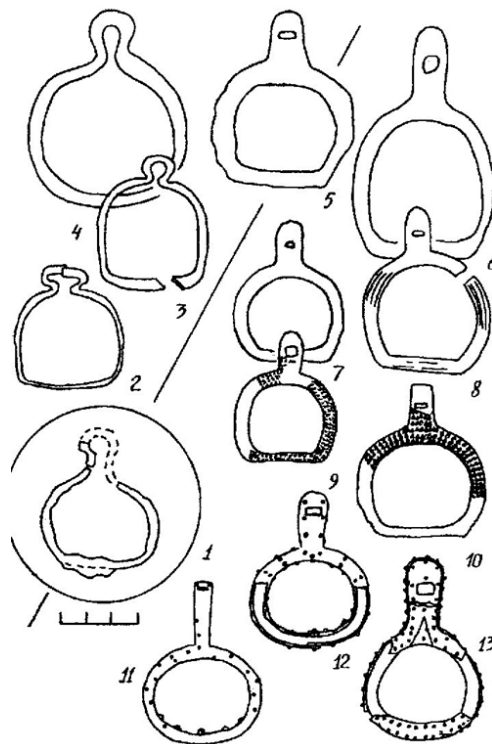
Jotov collected the Byzantine images of stirrups; he noted that these are stylized in most cases. They are clearly presented in the miniatures of the Paris manuscript “Homilies of Gregory the Theologian” from the end of the 9<sup>th</sup> century; in the “Sacra Parallela” manuscript from the middle of the 9<sup>th</sup> century; and on the “The Holy Warriors St Theodore and St George” icon, from the collection of the Sinai monastery of St Catherine. The stirrups represented in the first two images are triangular, and the third is a rectangular/arched shape (Jotov 2017: 145–148).

Turning to the archaeological material: in 1974, Xienbei tombs were discovered in Xiaomintun, near to Anyang, which were dated to the early or mid-4<sup>th</sup> century. The deceased’s head rested on a saddle, and beside it was a gold-plated bronze stirrup, which was obviously fixed to the left side of the saddle. During another excavation, a pair of stirrups were found near Huhehot; these date from the 4<sup>th</sup> century. In the tomb of one of the family members of the Northern Yan dynasty, Feng Sufu († 415), a stirrup made of mulberry covered with gold-plated bronze plates was found. The stirrups discovered in Kogurjo, from the 4<sup>th</sup> – 5<sup>th</sup> centuries, are generally oval in shape. The two pairs of stirrups found in Wanbaoting are also wood-based, covered with bronze (Dien 1986: 33–34). The stirrups covered by metal, and later the iron stirrup, appeared almost simultaneously in North China and Korea in the 4<sup>th</sup> – 5<sup>th</sup> centuries. At this time, North China was dominated by various nomadic dynasties, which may have played a decisive role in the appearance of armoured cavalry. The elite Xienbei and Tuoba, presumably speaking Mongolian dialects, formed the heavy horsemen; however, the

Chinese elite gradually took over this role. Thus, power gradually came into the hands of the Chinese, who reunited China (Dien 1986: 42).

The iron stirrup was in use in the Ruanruan Khaganate in the 5<sup>th</sup> – 6<sup>th</sup> centuries, given that the dominant elements of the Avars originated from the Ruanruan, and there are iron stirrups in the cemeteries of the Avars in the Carpathian Basin.

The Türk Khaganate played a decisive role in spreading the stirrup on the Eurasian steppe. Significant numbers of stirrups have been excavated in Türk tombs from the regions of the Russian Altai, Tuva, Middle Yenisey, Lower Ob, Tien-san, Issyk-Köl, Central and Eastern Kazakhstan, the Chu valley and Samarkand (Stark 2008: 147–149). In spite of the vast expanse of the empire, the types of stirrups seem to be consistent. Basically, two groups can be distinguished: (1) figure-8-shaped stirrups with loop-shaped eyelets, and (2) round or oval stirrups with rectangular eyelets. This distinction has no chronological significance (Savinov 1996: 16–20).

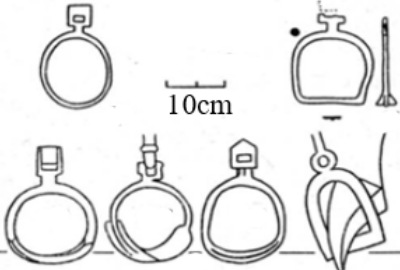
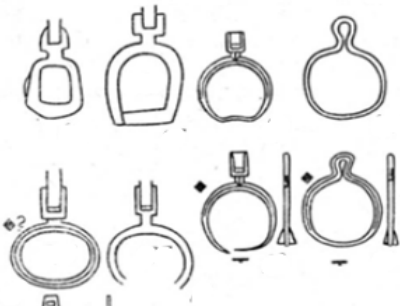

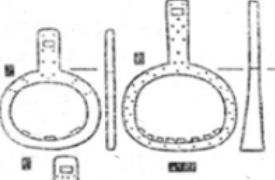


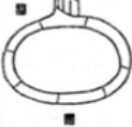


*The formation of stirrups according to Savinov (1996: 16–20): 1. Arbanskij čaatat (Khakassia), 2. Minusinsk basin, 3. Ust'-Tes' (Altay), 4–5. Kudyrge (Altay), 6. Kara Kobe (Altay), 7. Kok Paš (Altay), 8. Krokalevka (Novosibirsk), 9. Ulug-Horum (Tuva), 10. Krokalevka (Novosibirsk), 11. Krokalevka (Novosibirsk), 12. Krokalevka (Novosibirsk), 13. Krokalevka (Novosibirsk).*

The Avars brought the stirrup into the Carpathian Basin in 568. In the early Avar period, stirrups were generally long-eared, round in shape and ribbed, and made of high-quality iron. There are also smaller numbers with looped ears (Kovrig 1955: 30). Early Avar (568–c.630) tombs usually contain the lance and the stirrup together, which is an obvious reference to heavy cavalry. Kovrig emphasized that equestrian equipment of the early Avar period in the Carpathian Basin is similar to that found in the regions of the Altai, South Siberia and Mongolia (Kovrig 1955: 43); the shape of the stirrups changed in the late Avar period, when they became straight-soled and made of poorer-quality iron (Bóna 1987: 164, 173). According to Curta, early Avar stirrups were excavated together with spearheads, a typical sign of professional heavy cavalry. The stirrup allowed the rider to use the bow, spear, and sword alternately during combat (Curta 2008: 296–325, 314).

After the fall of the first Türk Khaganate, the Khazars established their empire on the steppe of Eastern Europe in the middle of the 7<sup>th</sup> century. As a successor state to the Western Türk Empire, they evidently continued that tradition. A common find in the graves of Saltovo is the iron stirrup. They are arched, and the sole is straight or slightly concave. There are two types of ears: a long rectangular shape, and rounded. The width of the sole can be narrow, medium or wide; however, there are also stirrups with curved soles and looped ears (Aksenov, Miheev 2006: 122–123).

The archaeological data reflect the spread of stirrups in the Asian part of the steppe and in the Carpathian Basin in the second half of the 6<sup>th</sup> century, which can be related to the creation of the Türk and Avar Khaganates. The Eastern European steppe was briefly under the rule of the Avars for a short time (555–568; 603–630); then it was the part of the Western Türk Khaganate (568–603). There are some traces of the use of stirrups in that period, but the iron stirrups were spread under the Khazar Khaganate (7<sup>th</sup> – 10<sup>th</sup> cc.) in Eastern Europe.

c.	leather	wood and plate	iron
8th			
7th			
6th			
5th			
4th			

*Ambroz 1973: 84.*

Before the iron stirrups, the following antecedents can be reconstructed. The initial form could have been a loop-eared stirrup made of organic material (leather strap or rope). Then, a hard wooden footrest was installed into the loop socket. The next step could have been the wooden stirrup. Later, it was covered and reinforced with bone or metal plates, and finally the metal stirrup was invented (Kyzlasov 1973: 35; Ambroz 1973: 84; Zhou 2009: 202–209). The two basic types of iron stirrups, with several typological variants, lived side by side in the Türk Kaganate. It is worth mentioning that the wooden stirrups survived and were in use among the Mongols in the 11<sup>th</sup> – 12<sup>th</sup> centuries, and there are ethnographic data regarding their use today among Mongols, Tuvans, Bashkirs, Kazakhs and Yakuts (Kyzlasov 1973: 33). At the end of August 2018, the author photographed traditional Kyrgyz stirrups at an exhibition at the ethnographic department of a bookstore in Bishkek, the capital of Kyrgyzstan. It is clear from the picture that the wooden stirrups, covered by bone and metal, have lived side by side with the metal stirrups.



In conclusion, the iron stirrup seems to be a common Sino-nomadic invention, and the appropriate conditions were created by the Xienbei people, in the Touba states of northern China and Korea. The iron stirrup spread eastward to southern Korea, and then to Japan. The westward spread was facilitated by the formation of the Türk Khaganate, which provoked the western fleeing of the Avars. Consequently, the stirrup appeared first in the sections of Eurasian steppe-belt ruled by these khaganates:

the steppe from Manchuria to the Volga and the Carpathian Basin. The Türks and the Chinese, especially due to the Tang conquests, could spread the stirrup along the classic Silk Road in the Tarim Basin and Sogdia. Before the Islamic conquest, Persia became acquainted with the iron stirrup through the Türks. Then, the Türks played a similar role in the Islamic world. The Islamic conquest of Transoxania, and later, in the 9<sup>th</sup> century, the Türk bodyguard and slave army, may also have promoted the use of stirrups. Byzantium and Europe became acquainted with the iron stirrup due to the Avars. As a result of its use, the bow could be more precisely targeted; and the rider was able to exert more striking and stabbing force. Presumably, it allowed the heavy armoured squad to switch weapons during combat. Thus, the common Sino-nomadic invention of the stirrup and other equestrian equipment made it possible to use heavy armoured cavalry in Chinese, Islamic, Byzantine, and European warfare, which can be regarded as dominant until the appearance of firearms.

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