

# Mapping the Spread of Mounted Warfare

Peter Turchin<sup>1,2</sup>, Thomas E. Currie<sup>2,3</sup>, Edward A.L. Turner<sup>2,4</sup>

<sup>1</sup>*University of Connecticut*

<sup>2</sup>*Seshat: Global History Databank*

<sup>3</sup>*University of Exeter*

<sup>4</sup>*University of Hertfordshire*

## Abstract

Military technology is one of the most important factors affecting the evolution of complex societies. In particular, *mounted warfare*, the use of horse-riders in military operations, revolutionized war as it spread to different parts of Eurasia and Africa during the Ancient and Medieval eras, and to the Americas during the Early Modern period. Here we use a variety of sources to map this spread.

## Introduction

One of the most important factors affecting the evolution of complex societies is the military technology available to the combatants (Turchin 2009, 2011). Offensive capability, in particular, depends greatly on the availability of transport animals, especially, the horse. The domestication of the horse enhanced offensive capability by giving the warriors a hitherto unprecedented mobility, both on the battlefield and in the military theater of operation. Mounted troops can rapidly concentrate for a massive strike at the enemy or, conversely, disperse in smaller groups that attack from an unexpected direction and then disappear over the horizon.

Horse-based military technologies, such as chariotry, mounted archery, and armored cavalry, repeatedly revolutionized warfare in Eurasia during the Ancient and Medieval eras, and in the Americas during the Early Modern period, after the horse was brought there by the Europeans. Before the age of gunpowder, horses as a supreme instrument of war were eclipsed only by ships in naval warfare and by elephants in the jungles of India and Southeast Asia.

In our previous work we postulated that the spread of horse-based warfare can be used to successfully predict where and when historical macrostates arose (Turchin et al. 2013). However, our empirical approach in that paper used coarse temporal resolution: 1000-year steps. We mapped the extent of chariotry in 1500 BCE and cavalry in 500 BCE and 500 CE. Here our goal is to refine the previous

*Corresponding author's e-mail:* peter.turchin@uconn.edu

*Citation:* Turchin, Peter, Thomas E. Currie, and Edward A.L. Turner. 2016. Mapping the Spread of Mounted Warfare. *Clodynamics* 7: 217–227.

approach by increasing temporal resolution and by expanding the evidentiary base on which our results are based.

We focus on *mounted warfare*, the use of horse-riders in military operations. This includes, primarily, *cavalry*—warriors or soldiers who ride horses in battle. We are also interested in situations where soldiers rode horses to get to battle, even if they subsequently fought dismounted. In other words, we are interested in horse-riding as a technology that increases mobility of humans both on the battlefield and between battles during military operations. The question that we ask is not when people started riding, but when horse-riding became systematically used in warfare. For this reason, we do not include cases where only a tiny proportion of the army, for example top officers, used horses. To be included in our chronology, cavalry had to constitute at least 5 percent of the overall army.

This report consists of two parts. The first one is a chronology of mounted warfare listing the sources we used to construct this time-line. The second part is the map based on the chronology.

## **A Chronology of Mounted Warfare**

The starting point for the chronology is 1000 BCE. There are several lines of evidence suggesting that horses were sporadically ridden much earlier than that. David Anthony and colleagues (Anthony 2007, Anthony and Brown 2011) have argued that the earliest evidence for riding consists of teeth and jaw pathologies associated with biting, found at Botai and Kozhai archaeological sites in Kazakhstan. Depictions of horse-riding on plaques and as ceramic figurines begin to be frequent from c.2000 BCE (Drews 2004, Kelekna 2009). However, Robert Drews (2004) marshals impressive amounts of evidence suggesting that horseback riders became important in combat only after 1000 BCE. Anthony and Brown (2011) concur, stating that “organized cavalry appeared only after 1000 BC.”

Drews (2004) argues that the critical technology that enabled military horse-riding was the bronze jointed snaffle bit, which dramatically improved the degree of control exerted by the rider on the mount. These bits first appear in the Caucasus area around 1000 BCE and spread north into the Pontic-Caspian steppe by the ninth century (Drews 2004: 91). However, graphic representations of horse riders wearing pants and wielding bows and arrows appear in Western Eurasia even earlier, around 1200 BCE (Kelekna 2009).

**X century BCE.** The conclusion from this discussion is that techniques that made mounted warfare possible were gradually developed, or introduced into the Pontic-Caspian steppe between 1200 and 800 BCE, and we assign the mid-point of this period as the beginning of mounted warfare in world history.

**IX century BCE.** Abundant evidence of horse riding from the Pontic-Caspian steppe. For example, 600 bronze bits, dating from the ninth through the sixth centuries BCE, have been found in this region so far (Drews 2004: 91). At about the same time or somewhat earlier than the two-part bit, the soft saddle made of cloth and leather appeared in eastern Central Asia (Baumer 2012).

Evidence for mounted combat from eastern Anatolia and northwestern Iran (Drews 2004). Syro-Hittite relief at Tell Halaf (Ellis 2004) shows a horseman equipped with shield and helmet.

The Urartian army “relied on around a hundred chariots, a few thousand horsemen and around 20,000 soldiers” (Liverani 2014). At the battle of Qarqar (853 BCE), the Syrian confederation fielded 2000 cavalrymen along with 4000 chariots, 1000 camels and 55000 infantry (Liverani 2014).

Assyrian reliefs during the reigns of Ashurnasirpal II (883–859 BCE) and Shalmaneser III (859–824 BCE) depict Assyrians fighting on horseback against enemy mounted archers. These enemies were probably Iranic-speaking groups that would later be called the Medes and the Persians, who had already been present in areas to the North and East of Assyria (Transcaucasia, Zagros Mountains). Assyrians are still in transition from chariot warfare, so their “cavalry” is a pair of horsemen, one shooting a bow and the other controlling both mounts. In Assyria, the impression of a transitional phase is also suggested by artistic depictions of horseback riders in the “donkey” seat, which does not allow the rider to control the mount effectively.

**VIII century BCE.** Mounted warfare becomes ubiquitous throughout all of the Eurasian Steppe. Horse-riding warriors are present in southern Siberia, including Pazyryk groups north of the Altay Mountains and the Minusinsk Basin of the upper Yenisey (Drews 2004: 76).

Towards the end of the century, Iranic-speaking nomads (Kimmerians and Skythians) begin raiding into the Middle East (Christian 1998). These horse-riders probably traveled from the Pontic-Caspian steppe to Anatolia and Mesopotamia via Caucasus, although it is possible that some groups used an alternative route east of the Caspian Sea (Vogelsang 1992). Alternatively, as suggested by Robert Drews (2004: 118-122), Kimmerians and Skythians originated in northwestern Iran and southern Caucasia, rather than migrated from the Pontic-Caspian steppe, as Herodotos tells it.

**VII century BCE.** In the Middle East, Iranic horse archers (Kimmerians) attack Urartu, Assyria, and Phrygia (Kelekna 2009). They carry mounted warfare West to

Western Anatolia and South to Egypt (Christian 1998). By the end of the century the Median polity forms. Median military operations spread mounted warfare through Mesopotamia and the Iranian plateau.

In East Asia, Skythian-type horsemen appear on the northwestern frontier of China. In 660 BCE they destroyed Wei and occupied the middle Yellow River Valley. But in 593 the Di were defeated and expelled by Jin, and retreated to Ordos. Nefedov (2009 citing Kryukov) argues that these “barbarians” (*Di* or *Ti* in Chinese sources) were horsemen, because their material culture was very similar to Skythian. However, according to Di Cosmo (Di Cosmo 2002: 75), Di/Ti were agropastoralists and there is no direct evidence that they used cavalry. On the other hand, it is likely that groups practicing horse archery (whatever their ethnic affiliation) reached northwest China (Gansu-Qinghai) in the VII c. and certainly by VI c. (personal communications from Nikolay Kradin and Nicola Di Cosmo).

**VI century BCE.** The rise and expansion of the Achaemenid empire, which used mounted warfare throughout its extent and on its frontiers, where the Persians conducted military operations. These areas include the eastern Mediterranean from Egypt to Greece in the West and the Indus River region in the East.

In Greece, the beginnings of cavalry may date as early as the seventh century BCE (Drews 2004: 81), but “in classical Greece warfare was dominated by the clash of infantry phalanxes and cavalry tended to play a peripheral role” (Hyland 2012). Evidence for the use of cavalry in battle begins to be abundant only in the fifth century BCE (see below). We assign the mid-point of these dates, VI c. BCE, as our estimate of the spread of mounted warfare to Greece.

Mounted warfare spreads to Central Europe by the end of the Halstatt C period (Kristiansen 1998). Speidel (2004) suggests that the battlefield tactic in which horsemen threw two spears at the enemy and then closed in with battleaxe spread to the Celts from the Illyrians.

**V century BCE.** In northwestern Africa, Carthaginian maritime trading posts were opposed by Pharusian nomadic cavalry (490 BCE) (Kelekna 2013). According to Strabo, the Mediterranean littoral at that time was home to vast herds of horses that yielded 100,000 foals a year (Kelekna 2013).

A terracotta frieze plaque of a horse race was found at Murlo in Etruscan Italy (De Puma et al. 1994: 95) showing proficient riding and suggesting cavalry at least by 500 BCE.

Effective riding of horses in Greece dates from about 650 BCE (Drews 2004), so we place significant cavalry in Macedonia at 600 BCE and in the southernmost parts of Greece by 500 BCE. For example, “at Delium (424 B.C.) Boetian horse contributed to the Athenian rout” (Hyland 2012).

In China the first contact with the Hunnu (Xiongnu) was reported in 457 BCE.

There were mounted warriors in the Donghu culture in the western (that is, the steppe part) of Manchuria (Pulleyblank 2000) .

**IV century BCE.** In Italy, cavalry is attested from the 4th century. Livy mentions horses at the siege of Veii and he talks of cavalry during the Samnite Wars at least by the mid-IV c. BCE (McCall 2002). Carthaginians also probably had cavalry at least by 400 BCE which they used to invade Italy in the late third century (Kelekna 2009).

In northern, China abundant evidence for adoption of mounted warfare by the Warring States (Di Cosmo 2002, Kelekna 2009). King Wuling of Zhao (307 BCE) accelerated the Chinese learning of horseback riding and archery (Kelekna 2009).

In fourth century BCE northern India, according to the Arthashastra, armies included a cavalry component (Boesche 2003).

The expansion of the Mauryan Empire spread mounted warfare through most of India (with the exception of the South).

**III century BCE.** La Tène Celts make the transition from the chariot to mounted warfare everywhere except Britain (Kruta 2004).

Cavalry in Sudan (Meroe). Kushites raised horses for both chariotry and riding and exported these to Lower Egypt (Kelekna 2013). They included small horses from the Sudanic savannah, and a “large, long-legged, high-quality horse breed” (Török 1997: 158, Kelekna 2013) These ponies were ridden, never driven. We have no evidence that cavalry supplanted the chariots and played a significant role in mounted warfare before 300 BCE. At this time the iron required for mounted warriors armed with large-bladed iron lances “diffuses west from Meroe” into the Sahel (Kelekna 2013).

**II century BCE.** Spread of mounted warfare to South China as a result of the Han conquest. Shi Huangdi unifies China with chariots and cavalry (Kelekna 2009).

**I century BCE.** Spread of mounted warfare to North Vietnam as a result of the Han conquest.

Britain in transition from chariot to mounted warfare, as noted by Caesar.

**I century CE.** Spread of mounted warfare within the Sahel occurred between the third century BCE (when cavalry was present in Sudan, see above) and the third century CE, when the Soninke elite started extending the territory of the Kingdom of Wagadu, using cavalry armed with iron swords and spears (Kelekna 2013). We use the mid-point of this period, but the spread was probably gradual from east to west. Note that Law (1980) argued previously that cavalry arrived in West Africa much later, in the early second millennium CE.

**II century CE.** Beginnings of mounted warfare in Arabia. It should be noted that there are earlier indications, such as burials of distinctive Arabian-type horses at Mileiha, UAE, dated to 100 BCE (Kelekna 2013). However, according to first century CE Roman geographers, Arabs did not have horses, relying on camels instead. Later, around 600 CE, cavalry was present in the armies of the Prophet, although during the early period they constantly suffered from a dearth of horses, so camels were the primary transport animal. In South Arabia, frequent mentions of cavalry begin in the second century. The impression is that cavalry was a small, but important part of the army (personal communication, Andrey Korotayev).

**III century CE.** In Cambodia cavalry is present during the Funan period (225-540) (Jacq-Hergoualc'h 2007). However, horses had to be imported, perhaps from India. The embassy of the Funan (Fan Zhan) received horses as a gift from the court of the Murundas around 230-240 CE, most likely from China via Vietnam. "To a greater extent than in India, horses were subordinate to elephants for both war and prestige" (Gin 2004).

Eritrea had a "highly structured military system" under King Ezana of Aksum (Tesfagiorgis 2010). Ezana led successful military expeditions against the Nubian cities Kush and Meroe, which suggest presence of cavalry in his army.

King of ancient Wagadu used cavalry as a striking force and had iron weapons (Kelekna 2013). We may consider that horse technology diffused from the East, through the Sahel and reached the region by 300 CE.

**IV century CE.** Japan (Nussbaum and Roth 2005).

Manchuria: The Mohe culture in the eastern (forest) part of Manchuria (Kradin, pers. comm.)

In Korea, murals in mid-4<sup>th</sup> century Goguryeo tombs (e.g. Anak no.3) paint horseback-riding scenes and armored cavalry, while further south in Silla armored cavalry was present by the end of the century (Lee and Leidy 2013: 194).

In Western Honshu (Japan), horses were used in warfare from the 4<sup>th</sup> century (late Kofun period) (Nussbaum and Roth 2005).

**V century CE.** Japan: spread of cavalry from Kansai in Honshu to the rest of Japan with the power of the central dynasties.

**VI century CE.** The armies of the Tibetan Empire (618–841 CE) had a well-developed cavalry famous for its heavy armor (full suits of chain mail both for warriors and horses). These warriors dismounted to do battle, so are probably best thought of as mounted infantry, rather than cavalry (Beckwith 1987).

**VII century CE.** The forest belt of Russia. This assumes that mounted warfare spread together with East slavic expansion into this region, which occurred between fifth and eight centuries.

The Middle Volga and Kama rivers region, due to the establishment of the Bulgar Khanate.

In Sri Lanka, the Isurumuniya Gala Vihara monument reliefs include a mounted horseman (Tadgell 2015: 226).

**VIII century CE.** Noble cavalry in Medang kingdom, Java (Gaukroger and Scott 2009: 134).

**IX century CE.** Elite Druzhina cavalry in Kievan Rus. Cavalry also supplied by steppe and Hungarian allies (Nicolle 1999).

**X century CE.** Scandinavia. Viking Norse used cavalry.

**XI century CE.** No new developments.

**XII century CE.** Champa (Southern Vietnam and Cambodia). Hokkien merchant persuades Champa king to replace elephants with horses. Taught Champa soldiers how to shoot arrows while riding (Kayoko et al. 2013: 64).

**XIII century CE.** Sweden takes Norway in 1320 CE. Norway-Denmark-Sweden unified 1398 CE. Foreign mercenary cavalry used at this time.

Nigeria: Muslim cavalry invasions of Jos Plateau repulsed by Sura tribesmen riding ponies, hurling javelins, and employing harrying guerrilla tactics (1300–1600 CE) (Kelekna 2013). In 1338 CE, Mossi horsemen from the upper river Volta (modern states Burkina Faso and Ghana) took and looted Timbuktu (Davidson 1998: 60).

**XIV century CE.** Western Siberia: Territory of the Sibirs (Siberia just East of the Urals), as a result of the Tatar expansion.

Eastern Siberia: Yakutia, as a result of the Yakut expansion down Lena River.

Malaysia, as a result of Majapahit expansion.

Jolof Kingdom (downstream Senegal river) already had 8,000–10,000 cavalry c.1510 CE, after they were supplied by the Portuguese. When the Portuguese arrived (XV c.), the Senegalese already had horses, probably acquired by trade. On the basis of this information we back-project the beginnings of cavalry in this region to the XIV c.

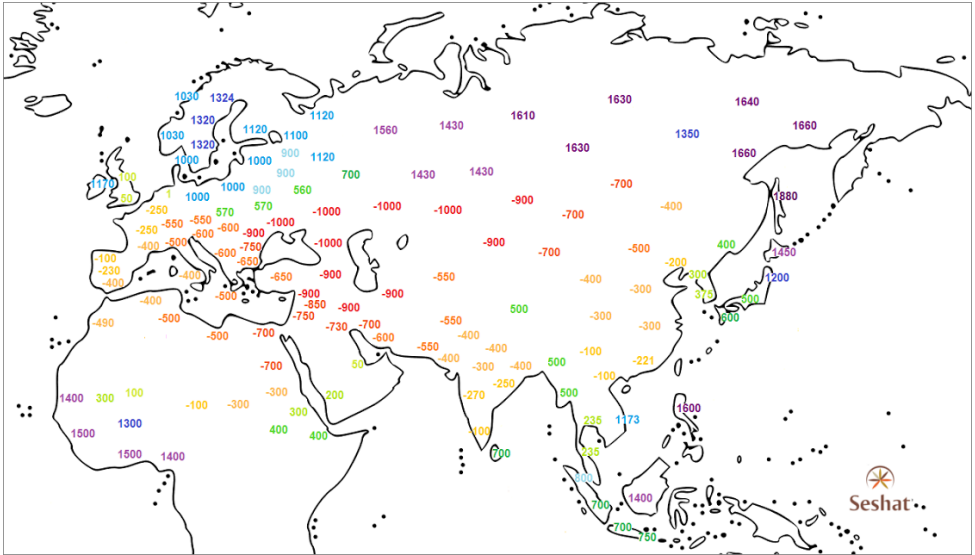
**XV century CE.** Tropical West Africa. Benin: the King of Portugal sent a gift of a horse in 1505 CE, which “perhaps suggests that horses were already established in Benin in 1505” (Law 1980: 22). Futa Jallon (Sierra Leone and Guinea) was conquered by Fulani from north of Gambia in the 1470s. This invasion may have brought the first horses into this region. Law also suggests that in the area of modern Republic of Guinea horses possibly “introduced into the area ... by invaders from the north during the fifteenth and sixteenth centuries” (Law 1980: 11). Hausa states had cavalry (Kelekna 2013).

**XVI century CE.** Philippines by the Spanish conquest.

In the New World: the Iberian conquest brought horses to most of South and Central America.

**XVII century CE.** Horses spread north from Mexico into the North American Great Plains. East Coast of North America, as a result of French, Dutch, and English colonization.





**Figure 1.** Map showing the chronological spread of cavalry across Afro-Eurasia.

## Acknowledgments

We thank Victor Mair, Pita Kelekna, Robert Drews, Nicola di Cosmo, Andrey Korotayev, and Nikolay Kradin for sharing their expertise in helping us to construct this chronology. Daniel Hoyer provided valuable comments and editing of the manuscript.

This work was supported by a John Templeton Foundation grant to the Evolution Institute, entitled "Axial-Age Religions and the Z-Curve of Human Egalitarianism," a Tricoastal Foundation grant to the Evolution Institute, entitled "The Deep Roots of the Modern World: The Cultural Evolution of Economic Growth and Political Stability," an ESRC Large Grant to the University of Oxford, entitled "Ritual, Community, and Conflict" (REF RES-060-25-0085), a grant from the European Union Horizon 2020 research and innovation programme (grant agreement No 644055 [ALIGNED, [www.aligned-project.eu](http://www.aligned-project.eu)]), and an European Research Council Advanced Grant to the University of Oxford, entitled "Ritual Modes: Divergent modes of ritual, social cohesion, prosociality, and conflict." We gratefully acknowledge the contributions of our team of research assistants, post-doctoral researchers, consultants, and experts. Additionally, we have received invaluable assistance from our collaborators. Please see the Seshat website ([www.seshatdatabank.info](http://www.seshatdatabank.info)) for a comprehensive list of private donors, partners, experts, and consultants and their respective areas of expertise.

## References

- Anthony, D. W. 2007. *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*. Princeton: Princeton University Press. doi: 10.1515/9781400831104.
- Anthony, D. W. and D. R. Brown. 2011. "The Secondary Products Revolution, Horse-Riding, and Mounted Warfare." *Journal of World Prehistory* 24(2-3):131-160.
- Baumer, C. 2012. *The History of Central Asia: The Age of the Steppe Warriors*. I. B. Tauris. doi: 10.1007/s10963-011-9051-9.
- Beckwith, C. I. 1987. *The Tibetan Empire in Central Asia*. Princeton: Princeton University Press.
- Boesche, R. 2003. "Kautilya's Arthashastra on War and Diplomacy in Ancient India." *Journal of Military History* 67(1):9-37. doi: 10.1353/jmh.2003.0006.
- Christian, D. 1998. *A History of Russia, Central Asia, and Mongolia*. Oxford: Blackwell.
- Davidson, B. 1998. *West Africa Before the Colonial Era*. London: Routledge.
- De Puma, D., R. Small, and J. Penny. 1994. *Murlo and the Etruscans: Art and Society in Ancient Etruria*. Madison, WI: University of Wisconsin Press.
- Di Cosmo, N. 2002. *Ancient China and Its Enemies: The Rise of Nomadic Power in East Asian History*. Cambridge: Cambridge University Press. doi: 10.1017/cbo9780511511967.
- Drews, R. 2004. *Early Riders: The Beginnings of Mounted Warfare in Asia and Europe*. New York: Routledge. doi: 10.4324/9780203389928.
- Ellis, J. 2004. *Cavalry: The History of Mounted Warfare*. Barnsley: Pen & Sword Books Ltd.
- Gin, O. K. 2004. *SouthEast Asia: A Historical Encyclopedia, from Angkor Wat to East Timor*, Volume 1. Santa Barbara, CA: ABC CLIO.
- Hyland, A. 2012. "The Development and Training of Cavalry in Greece and Rome." In *The Oxford Handbook of Warfare in the Classical World*, edited by B. Campbell and L. A. Tritle. Oxford: Oxford University Press. doi: 10.1093/oxfordhb/9780195304657.001.0001.
- Jacq-Hergoualc'h, M. 2007. *The Armies of Angkor: Military Structure and Weaponry of the Khmers*. Bangkok: Orchid Press.
- Kayoko, F., S. Momoki, and A. Reid, editors. 2013. *Offshore Asia: Maritime Interactions in Eastern Asia Before Steamships*. Singapore: Institute of Southeast Asian Studies.
- Kelekna, P. 2009. "The Politico-Economic Impact of the Horse on Old World Cultures: An Overview." In *Sino-Platonic Papers*, Number 190, edited by V. H. Mair. Philadelphia, PA: University of Pennsylvania.
- Kelekna, P. 2013. "Northern Africa: Equestrian Penetration of the Sahara and the Sahel and Its Impact on Adjacent Regions." In *British Archaeological Reports*, edited by S. Olsen. Oxford.

- Kristiansen, K. 1998. *Europe before History*. Cambridge: Cambridge University Press.
- Kruta, V. 2004. *Celts: History and Civilization*. London: Hachette.
- Law, R. 1980. *The Horse in West African History*. Oxford: Oxford University Press.
- Lee, S. and D. P. Leidy. 2013. *Silla: Korea's Golden Kingdom*. New York: Metropolitan Museum of Art.
- Liverani, M. 2014. *The Ancient Near East. History, Society and Economy*. London: Routledge. doi: 10.4324/9781315879895.
- McCall, J. B. 2002. *The Cavalry of the Roman Republic*. New York: Routledge.
- Nefedov, S. A. 2009. *War and Society* (In Russian: *Voyna i obschestvo. Faktornyi analiz istoricheskogo protsessa*). Moscow: Publishing House "Territoriya buduschego."
- Nicolle, D. 1999. *Armies of Medieval Russia, 750–1250*. Osprey Publishing.
- Nussbaum, L. F. and K. Roth. 2005. "Horses." In *Japan Encyclopedia*, 354–355.
- Pulleyblank, E. G. 2000. "Ji 姬 and Jiang 姜: The Role of Exogamic Clans in the Organization of the Zhou Polity." *Early China* 25:1–27. doi: 10.1017/s0362502800004259.
- Speidel, M. P. 2004. *Ancient Germanic Warriors: Warrior Styles from Trajan's Column to Icelandic Sagas*. London: Routledge. doi: 10.4324/9780203475874.
- Tadgell, C. 2015. *The East: Buddhists, Hindus and the Sons of Heaven*. New York: Routledge. doi: 10.4324/9780203820940.
- Tesfagiorgis, M. G. 2010. *Eritrea*. Santa Barbara, CA: ABC-CLIO.
- Török, L. 1997. *The Kingdom of Kush. Handbook of the Napatan-Meroitic Civilization*. Leiden: Brill. doi: 10.1163/9789004294011.
- Turchin, P. 2009. "A Theory for Formation of Large Empires." *Journal of Global History* 4:191–207. doi: 10.1017/s174002280900312x.
- Turchin, P. 2011. "Warfare and the Evolution of Social Complexity: A Multilevel Selection Approach." *Structure and Dynamics* 4(3), Article 2:1–37.
- Turchin, P., T. E. Currie, E. A. L. Turner, and S. Gavrilets. 2013. "War, Space, and the Evolution of Old World Complex Societies." *PNAS* 110(41):16384–16389. doi: 10.1073/pnas.1308825110.
- Vogelsang, W. J. 1992. *The Rise and Organisation of the Achaemenid Empire: The Eastern Iranian Evidence*. Leiden: Brill.