

THE GUNPOWDER AGE: CHINA, MILITARY INNOVATION, AND THE RISE OF THE WEST IN WORLD HISTORY

(TONIO ANDRADE)

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The Gunpowder Age succeeds in its lesser goal, which is convincing the reader that the common belief the Chinese only used gunpowder for fireworks is wrong. But it fails in its greater goal, which is convincing the reader that except for a brief period in recent history, China has been the equal of the West in the technology of warfare. And, in the wreckage of its failure, it confirms and reinforces the accurate perception that China has, for a thousand years, been lacking in scientific and cultural innovation. Since a lack of innovation has negative implications for the Chinese future, and by modern Western standards is a negative judgment on Chinese society, this is probably not the effect that the Sinophile author of this book, Tonio Andrade, intended to achieve.

Andrade accepts the hard-to-deny contention that warfare drives the progress of military technology. He implicitly accepts the related contention that European progress as a whole, from roughly A.D. 900 on, was driven by the “competing state” paradigm, of which military innovation is an important component. For purposes of this book, all military innovation is gunpowder innovation; Andrade does not discuss other aspects of Chinese military practice, except as they impinge on gunpowder tactics, as in the case of fortifications. The author’s stated goal is to examine “the full sweep” of gunpowder history in China, and to prove both that China did not fall behind the West until the modern era and that it innovated successfully beyond the mere invention of a crude form of gunpowder.

A common argument, and a commonly accepted argument, is that China from A.D. 900 on did not materially progress (in the sense of escaping the Malthusian Trap or of innovating in significant ways that benefitted the society) because it was a mostly unitary state not subject to existential threats, thus not subject to the same competitive pressures as Europe in the same time period. Andrade rejects this, claiming that instead “China’s past is filled with war and interstate competition.” His central claim is that only during what he calls the “Great Qing Peace,”

from roughly A.D. 1725–1850, did China fall behind the West in military prowess. To demonstrate this, he offers both narrative discussion and a line chart, showing the number of conflicts per year in each of China and Europe from A.D. 1350–1920. The Great Qing Peace happened at the same time that European military activity, and therefore innovation, intensified, while it stagnated in China, although up to that time China was supposedly the equal of Europe in military innovation and prowess. (Andrade cautions the reader, though, that China's stagnation during the Great Qing Peace was not due merely to a lack of warfare; he notes the numerous theories competing to explain the undoubted stagnation, and here as elsewhere is careful to not reject out of hand either revisionist or traditionalist explanations of Chinese behavior.) Either way, the eighteenth and nineteenth centuries were a time when China fell far behind the West in all aspects.

Thus, Andrade believes that an image of China as always unitary and static, if not stagnant, is wrong, because it applies to the whole of Chinese history what happened during a small slice of time. Moreover, the usual scholarly view of Chinese culture overall as not as interested in progress as the West, in large part because of Confucianism, is also derived from an overly narrow focus on that time period, because during the Great Qing Peace, and only then, "Confucian scholars understandably tended to focus on nonmilitary matters." Given that this tends against the opinion of informed scholars, in order to prove his point most of Andrade's book is devoted to finding and relating the opinions and activities throughout Chinese history of Chinese statesmen, scholars, and scientists in favor of, and in the cause of advancing, aggressive progress through gunpowder weapon innovation. This is obviously necessary, because if it is both true that conflict was the norm in Chinese history, and that little innovation resulted, Andrade's thesis falls apart before it even gets going. Unfortunately, that's exactly what Andrade ultimately proves.

Having clearly laid out his thesis and its basic reasoning, Andrade next turns to the details of Chinese history, beginning with the Song Dynasty (A.D. 960–1279). He notes the various dynamic aspects of the Song, including their navigation by magnetic compass. He does not, however, note that the Chinese had had the compass for nearly a thousand years by that time, during which they did *not* use it for

navigation, which would seem relevant to Chinese rates of innovation when discussing gunpowder. Andrade calls this the “Song Warring States Period,” attempting to piggyback on the better known actual “Warring States Period,” from 475–221 B.C. His point is that the Song had powerful nearby enemies against whom they had to contend (the Xi Xia and the Jin, as well as the Mongols), and thus while the dynasty itself did not have internal conflict (it was a “long-term state system”), the amount of conflict was analogous to Europe from A.D. 1450 onwards. Andrade ascribes Song dynamism (in all areas, not just military), to “what [modern military historian] Geoffrey Parker has called the ‘challenge and response’ dynamic,” which seems plausible, although Andrade uses the term “challenge and response” throughout the book while apparently remaining unaware its real originator was the much more famous Arnold Toynbee, who saw all of human history through that frame. Nor does Andrade show that innovation was common during the original Warring States Period, or for that matter at any point up to then. In any case, this overview of the Song is meant to establish a parallel between Europe and China in warfare driving innovation to parity as the normal state of affairs, and later divergence as an anomaly.

Andrade then turns to the details of the key of his book, gunpowder. He explains that it was invented around A.D. 1000 by the Chinese, although it was a crude substance compared to later gunpowder, useful only as a moderately successful incendiary. Within 150 years, though, the Song were using “fire lances,” “a long staff at the end of which is affixed a tube filled with gunpowder.” Eventually, pellets, arrows and other items that could be expelled were added, until a crude type of pseudo-gun was formed. Mostly, though, these seem to have been used as incendiaries (the Chinese habit of lack of clarity in exposition keeps showing up here, such as calling these devices “fire medicine,” a term used to cover a huge variety of divergent devices). When fighting the Mongols, apparently there is also some suggestion that the Song developed “iron bombs,” which may have been a type of contained gunpowder explosive, although they were still using bamboo tubes as “guns.”

Here, though, Andrade’s narrative begins to suffer badly from the same fault that afflicts Greg Pomeranz’s *The Great Divergence* in its discussions of China—a great amount of supposition and interpolation, always

resolved in favor of the interpretation that favors the author's thesis. This seems to be a besetting problem of Sinophile authors; the same problem affects Joseph Needham's massive study of Chinese history, which has been justly accused of exaggerating Chinese technological accomplishments, and on which Andrade repeatedly relies. He also relies very heavily on Chinese-language writings by several Chinese authors of recent vintage, about whom the reader knows and can know nothing. We can know, though, that free inquiry of academics in China today is limited at best, and that the Party is more likely to reward those finding a hidden glorious Chinese past than those confirming Western superiority.

Andrade next covers the early Ming Dynasty, beginning in A.D. 1367. Around this time the first metal guns emerged; we are told repeatedly that the Ming "stipulated that gunners should comprise 10 percent of soldiers." These were very short and light guns, apparently almost exclusively used in an anti-personnel manner, what are today called "hand cannon." It is at this point that Andrade begins comparisons to Europe, noting that the first guns appear in Europe A.D. 1326 (oddly, before they appear in the lands between China and Europe, but without prior experimentation in Europe, implying that they arrived fully formed from China in an unknown manner, probably through the Mongols). European guns were initially also small, but extremely rapidly became bigger—within less than fifty years, the French were casting cannon weighing two thousand pounds. Andrade ascribes this rapid innovation to the difference between European fortifications, relatively thin and made of stone that could be battered down with large cannon, and Chinese fortifications, which were mostly many meters thick and made mostly of tamped earth on which even large cannon had little effect, meaning that in China, you had to storm the gate complex to enter a fortified space. He does not explain why large cannon were not developed to smash Chinese gate complexes, nor why by the 1600s, the Portuguese were using carronades to breach Chinese-style earth walls in China, while the Chinese had still not developed beyond crude hand cannon. Nor does he explain the many other massive and very rapid advances in European cannon, such as huge improvements in gunpowder quality and the use of iron balls, as well as very quick development of the "classic cannon . . . long and thin, tapering toward the

muzzle, . . . [which] gave the gunpowder more time to impart energy to the projectile.” (On a side note, Andrade claims, giving the formula for kinetic energy, that because iron is three times denser than the marble balls used by the Chinese, “an iron ball could be ten or twenty or thirty times more destructive at the same velocity than a marble ball of the same dimensions, depending on that velocity.” But kinetic energy is *directly* proportional to the mass of the object and proportional to the *square* of velocity, so if the velocity is the same, the iron ball would only have three times the kinetic energy—Andrade appears to be confusing which variable is squared.)

By the early 1500s, having made no improvements in the meantime, the Chinese were introduced to the vastly improved European guns (via the Portuguese), and “immediately recognized that they were superior to their own.” Andrade claims, plausibly enough, that the Chinese promptly got to work catching up. His main source for this is Wang Hong (1466–1536), a Ming functionary. “Although his enemies nearly succeeded in having him written out of history, today Chinese celebrate him as an anti-imperial hero and the first successful partisan of ‘learning from the west.’” Again, though, Andrade does not seem to grasp that the modern Party may choose to exaggerate Wang Hong’s contributions as part of a propaganda campaign that emphasizes China’s progress and de-emphasizes its “Confucian” reputation for stasis. Other sources seem a bit thin, too—Andrade cites an undergraduate thesis from 2013 for critical statistical data about Korean marksmanship with seventeenth-century smoothbore muskets, to suggest they were really using rifles. Being an undergraduate doesn’t mean the author is wrong, but big claims require big evidence.

And even if you believe Wang Hong’s ambiguous claims, the evidence is very slim that the Chinese immediately matched the Portuguese, as hard as they may have tried. Variations on the phrase “It seems likely” become depressingly common at this point in the book. Certainly the Chinese worked to copy the “Frankish cannon,” but Andrade is desperate to show that the Chinese not only succeeded but innovated, correctly identifying that demonstrating mere copying reinforces the views he is trying to demolish. So, he repeatedly makes claims similar to “as they used [the Frankish guns, they] ingeniously altered them. . . . Indeed, scholars in China have taken to referring to the late Ming period

as a period of fusion, during which there occurred a hybridization of Western guns and traditional Chinese guns.” His sole evidence for this, though, is a claim by a Chinese-language source that the Chinese created guns with iron interiors and brass exteriors, a supposedly superior design of which I have never heard and to which I can find no reference anywhere (and anyway, I am pretty sure that “brass” cannons are actually bronze). And at the same time, he describes how the Chinese reverse-engineered a captured Portuguese gun with an elevation screw—by casting the screw as one piece with the gun, since they failed completely to understand how it worked. This hardly suggests innovation. Not once in this book does Andrade give an demonstrable example of the continual advancement by leapfrogging over the advancements of others that has characterized the West for the better part of a millennium (and characterized ancient Greece and Rome). And this failure to actually show any innovation destroys the main point of Andrade’s book, because if the Chinese only ever copied (and often badly), therefore at the maximum point of advancement only being able to achieve mere parity, then the Chinese haven’t innovated in gunpowder warfare for a thousand years.

Perhaps realizing that he’s not succeeding at showing innovation in weapon design, Andrade then goes on a very long digression about drill techniques for volley fire, involving interchange of ranks and ordered reloading, claiming that the Chinese originated it and it was an ancient, highly developed technique. He does this to rebut the claim that Europeans originated drill, but his examples of supposed volley fire manuals are sparse, and his evidence for actual use of drilled volley fire in the European manner is slim to none (which is probably why all military historians, as Andrade admits, ascribe the development of drilled volley fire by Europeans as a critical and unique element of European global dominance).

This discussion merges into a discussion of musketry in the 1600s, where Andrade attempts to show that Chinese (and Korean) musketry was the equal of European. Andrade claims that the seventeenth and eighteenth centuries were the “Age of Parity”; he says that “Some Sinophone historians refer to this period as the era of Sino-Western military hybridization.” Maybe they do, but given that Andrade gives not a single example of any innovation by Asian countries in gunpowder

weaponry after A.D. 1300, a better term would be the “era of maximum frenzy of Chinese copying of Western innovations so they could keep up as best they could.” Andrade makes claims such as that in this time period “Everyone was adopting and adapting from everyone,” implying that “everyone” was responsible for innovation. But the Chinese innovated nothing at all from A.D. 1100 on. They copied European guns, European fortifications, European navigation and European ship rigging, none of which they had anything even vaguely equivalent to, and also copied everything else they could get their hands on. Andrade further notes the superiority of the European scientific method, which allowed for using Newtonian physics to calculate ballistics and Boyle’s gas laws to calculate howitzer fuse timing, something the Chinese never achieved anything remotely similar to. Unable to demonstrate any technological innovation, Andrade closely examines a variety of minor conflicts between the Chinese and the Portuguese, Dutch and Russians, some ending in defeat for the Chinese, some for the Westerners, and concludes that there was “parity.” Maybe. Or maybe the Westerners, many of whom were small groups of adventurers without government support, sometimes lost despite vastly superior technology, especially when far from home and without allies or the possibility of resupply. The Chinese weren’t fighting in Lisbon or Moscow, after all, but in or near their major cities.

After this so-called period of parity, with small conflicts, there was little fighting by China from 1750 to 1840 or so. In this period apparently the Chinese not only failed to innovate, which Andrade ascribes to the “Long Qin Peace,” but their warfare skills totally fell apart. Their gunpowder was thrown away as worthless by Westerners when captured; they had cannon with “uneven bores and primitive carriages”; only matchlock muskets; terrible fortifications; and so on. That is, after 150 years of careful study and supposedly wholly successful attempts to match the West, in less than a hundred years (not really a “long peace”) the Chinese regressed totally, unable even to cast a straight bore cannon. This seems like a lot to chalk up to a mere reduction in warfare, especially since the graph on which Andrade relies to show this shows only a modest reduction in Chinese conflicts in this time period (and he also specifically goes to some lengths to say his graph is pretty unreliable).