

The Gunpowder Revolution

...

Lecture goals

- Understand the early history of gunpowder and gunpowder weapons.
- Examine gunpowder as a chemical technology.
- Explain the social, political and economic effects of the adoption of gunpowder for military purposes.

What is gunpowder?

Sulfur + charcoal + potassium nitrate.

When ignited, burns very quickly and produces pressure.

Gunpowder precedents: Other chemical weapons

- Fire

- The earliest chemical weapon

- Flaming arrows

- Greek fire

- Burning oil

- Used to defend fortifications (maybe)

- Catapulted fire

- Flaming cats and birds



Development of gunpowder

- Created in 800s in China
 - Probably as part of medical experiments
 - Early use centered on fireworks
- By 1000s, gunpowder variants used in China for flaming arrows, fire lances
 - What is a fire lance? <https://www.youtube.com>
- By 1287, first hand cannons

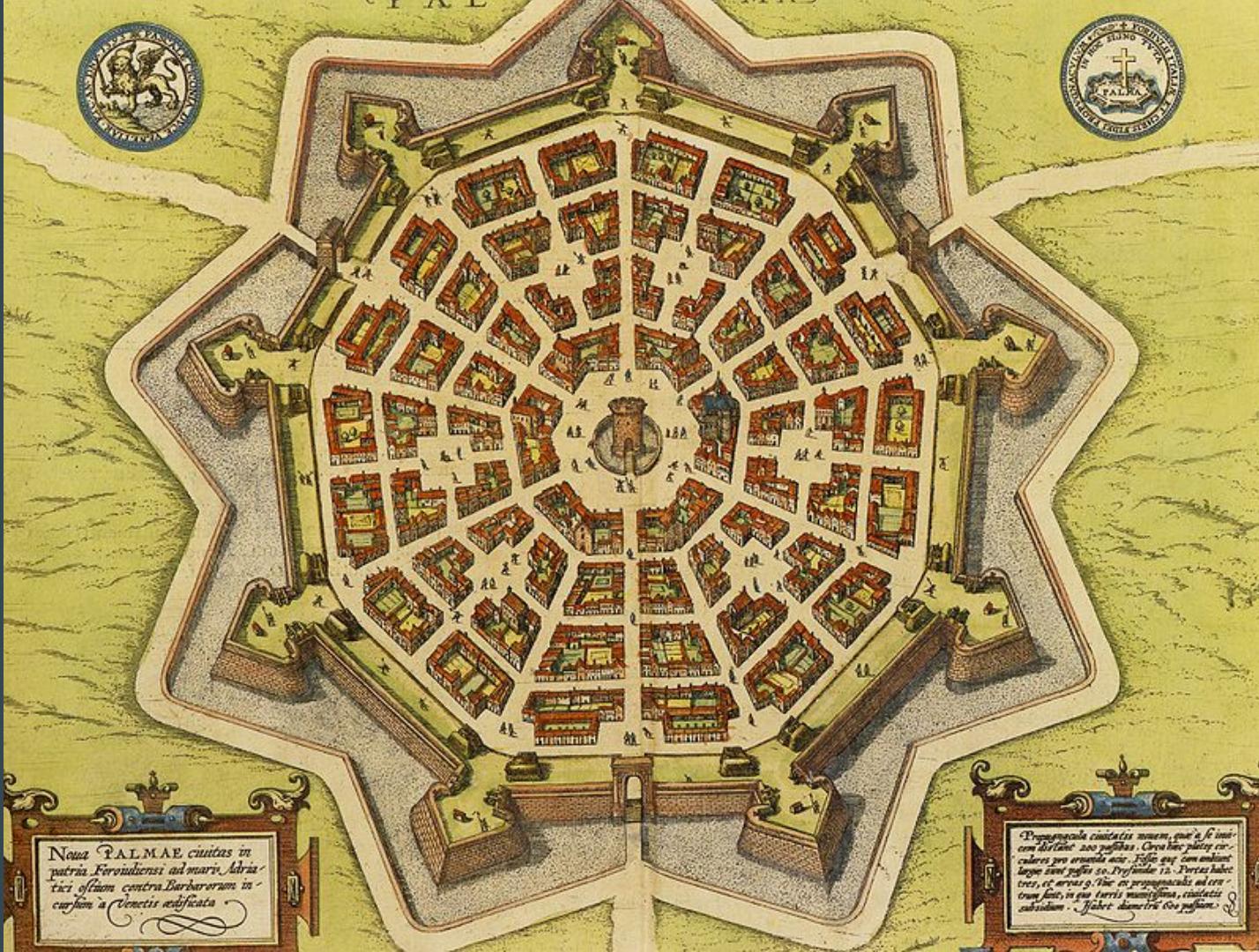


Gunpowder in Europe

- 1241: Mongols use gunpowder weapons against Hungarian troops at Battle of Mohi
 - Unclear whether Europeans learned how to create gunpowder here
- 1267: Roger Bacon writes about gunpowder for the first time
 - First written European source
- Cannons in use by Europeans by 1340s

Significance of gunpowder

- First large-scale use of a chemical weapon in warfare
- Makes fortifications less effective
 - And increases the importance of pitched battles
 - Eventually leads to new fortifications (“trace italienne”)
- Increases importance of footsoldiers
 - Continuing trend started by archers
 - Adds to social and political prestige of commoners
- Requires more training for soldiers
 - Aiming and firing guns is hard



Nova PALMAE ciuitas in
patru Feruidensi ad mari, Adria-
tici ostium contra Barbarorum in-
cursum a Venetis adficiata

Propriocula ciuitatis nomen, quæ a se ini-
com dicitur 200 pagis. Circa huc plures cir-
cularis pro ornanda sit. Figitque cum ambienti
longe super pagis 50. Portas habet
tres, et arcos 3. Tunc ex propriocula ad eam
trum facti, in qua terris manegimus, ciuitatis
subsidia. Habet diametro 60 pagis.

Gunpower's significance (continued)

- Logistical challenges
 - Transporting gunpowder is hard
 - Unlike other forms of ammunition (e.g., arrows), you can't make gunpowder on-site
 - Which means gunpowder-equipped armies need long supply chains and logistical infrastructure
- Increases interaction between scholarly community and military community
 - Because scholars are interested in the chemistry of gunpowder
 - Innovations in gunpowder production eventually impact other fields, such as medicine production (e.g., dry mixing)

Gunpowder's greatest significance

Gunpowder greatly increases the cost of making war.

- Which in turn increases demand for bureaucratic, financial and logistical structures that can support this cost.