

The Plague (*Yersinia Pestis*) in China: From Historical Perspectives to Modern Day Genetics

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Introduction and Research Questions

- European studies suggest that the plague caused the human immune system to evolve.¹
- These changes in our immune system might increase our risk of developing autoimmune disorders, such as Crohn's.²
- The Second Plague Pandemic likely originated near Lake Issyk Kul in Kyrgyzstan, near the modern-day border of China.³



Research Questions:

1. What insights can historical Chinese medical texts provide about the plague?
2. Did the plague (*Yersinia pestis*) exert selective pressure leading to the evolution of our immune system?

Historical Perspectives

Chinese Medical Traditions:⁴

- Medical Lineages and Training
- Materia Medica
- Epidemics and Plague Cults



The Plague in China:

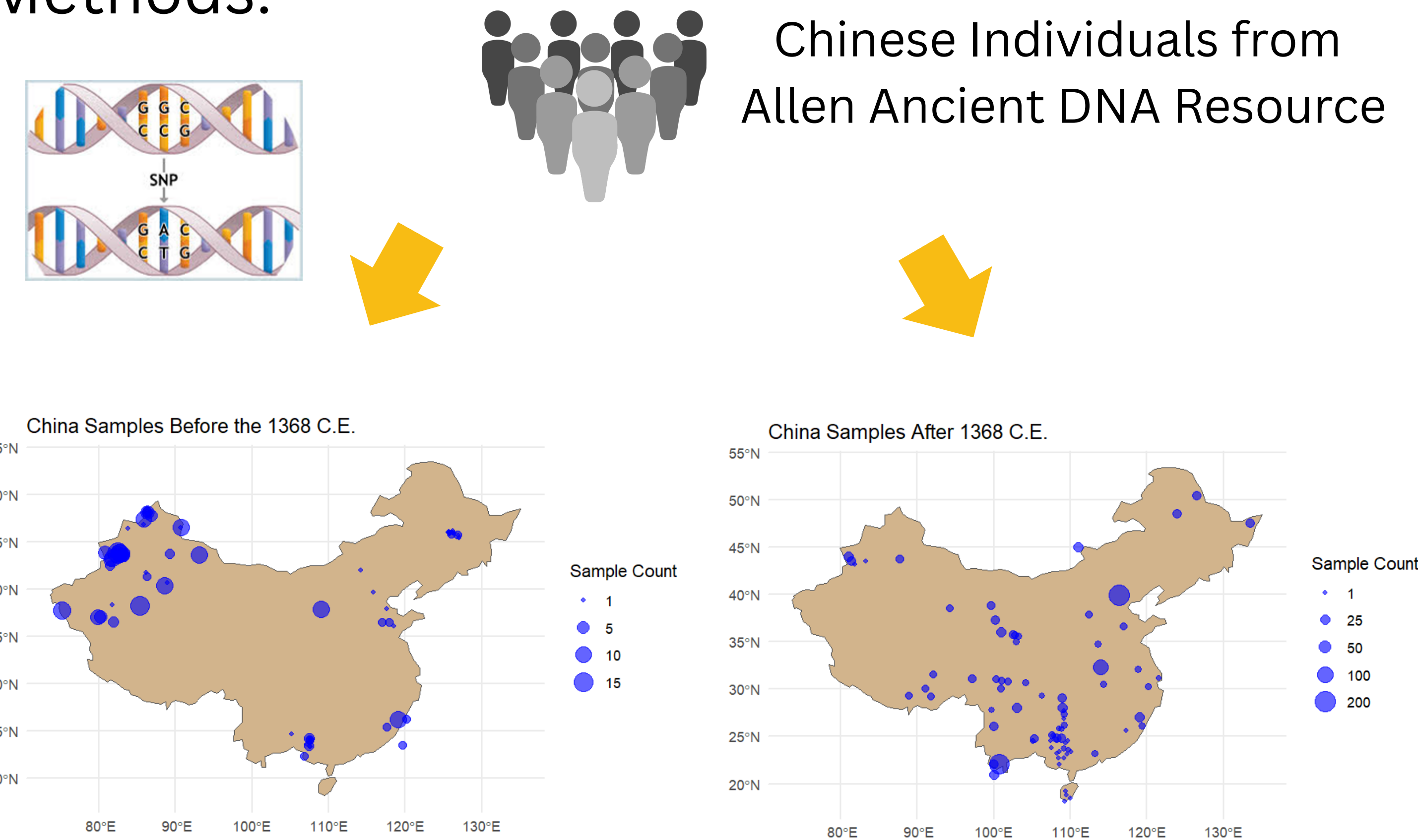
“The plague frightened and killed. It began in the land of darkness. Oh, what a visitor! It has been current for fifteen years. **China was not preserved from it**, nor could the strongest fortress hinder it.” - Abū Ḥafs ‘Umar Ibn al-Wardī in *Essay on the Report of Pestilence* (ca. 1348)

“The **puffy swollen geda's as big as a polo ball**. As swelling-qi pervades the body, sweat of course will fall.”- From *Pasture-Director's Collection for Contented Steeds* (Simu anji ji 司牧安驥集)⁵

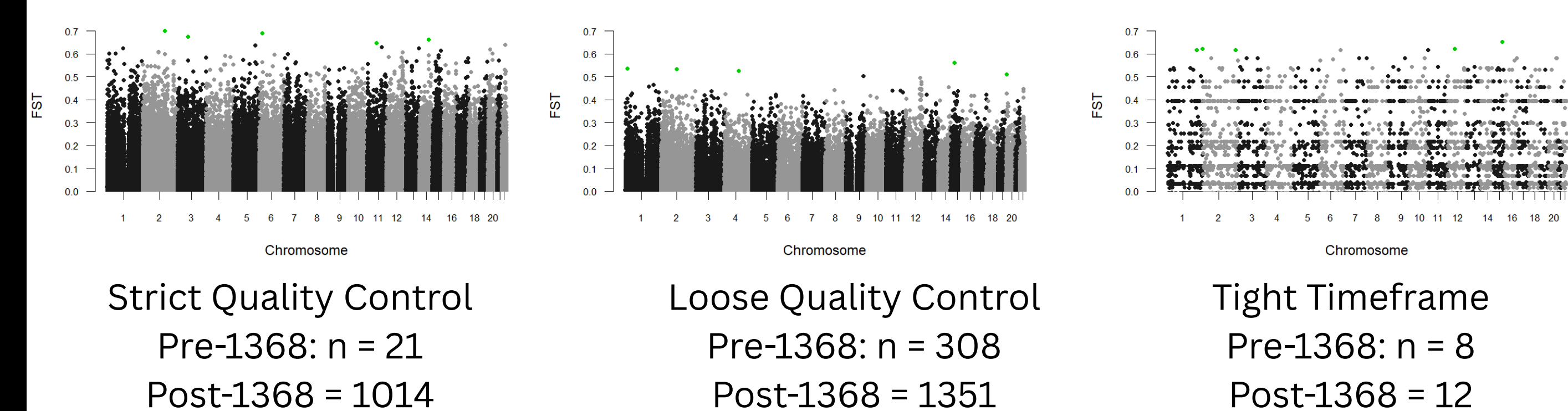


Computational Genomics

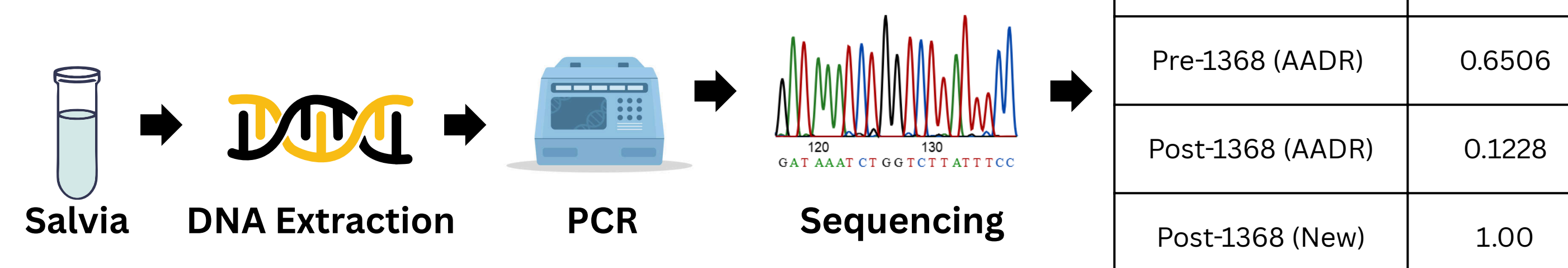
Methods:



Results:

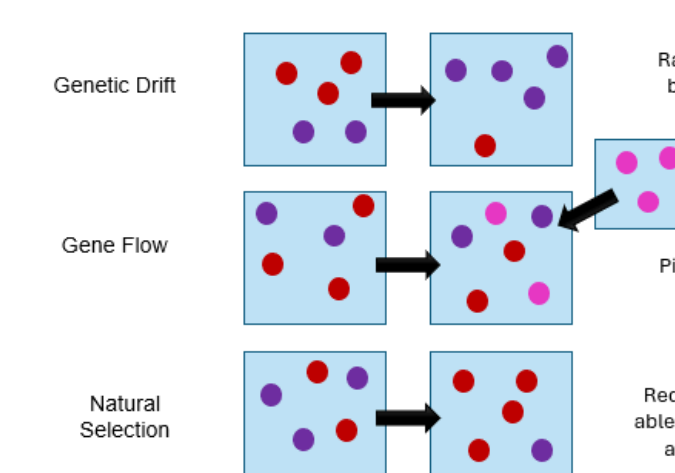


In Vitro Analysis of rs922452:



Conclusion:

- High FST values indicate that there were changes in allele frequencies, suggesting that evolution occurred.
- Different quality control criteria and timeframes lead to different conclusions about which SNPs have the highest FST values.
- Is this evidence for natural selection?

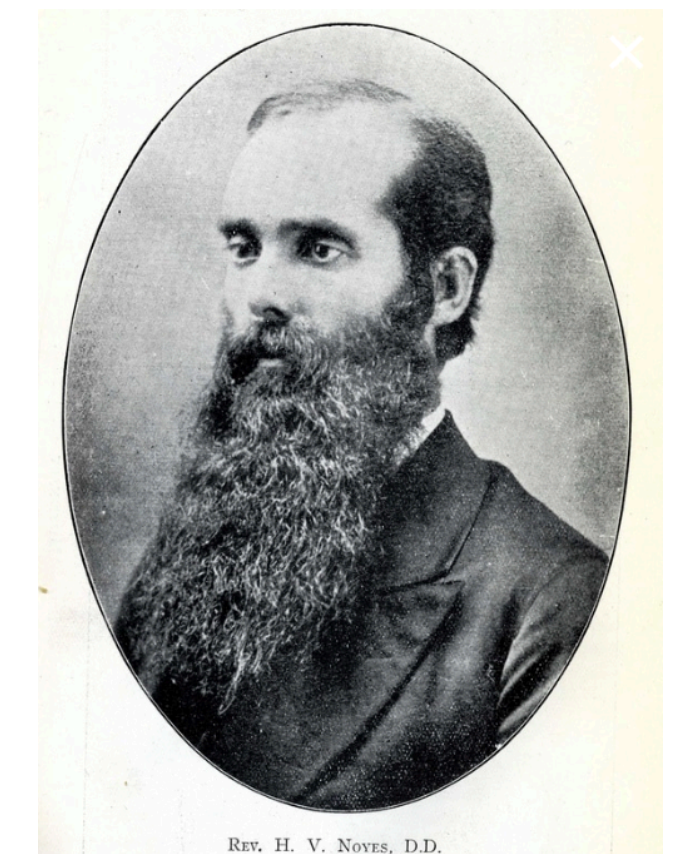
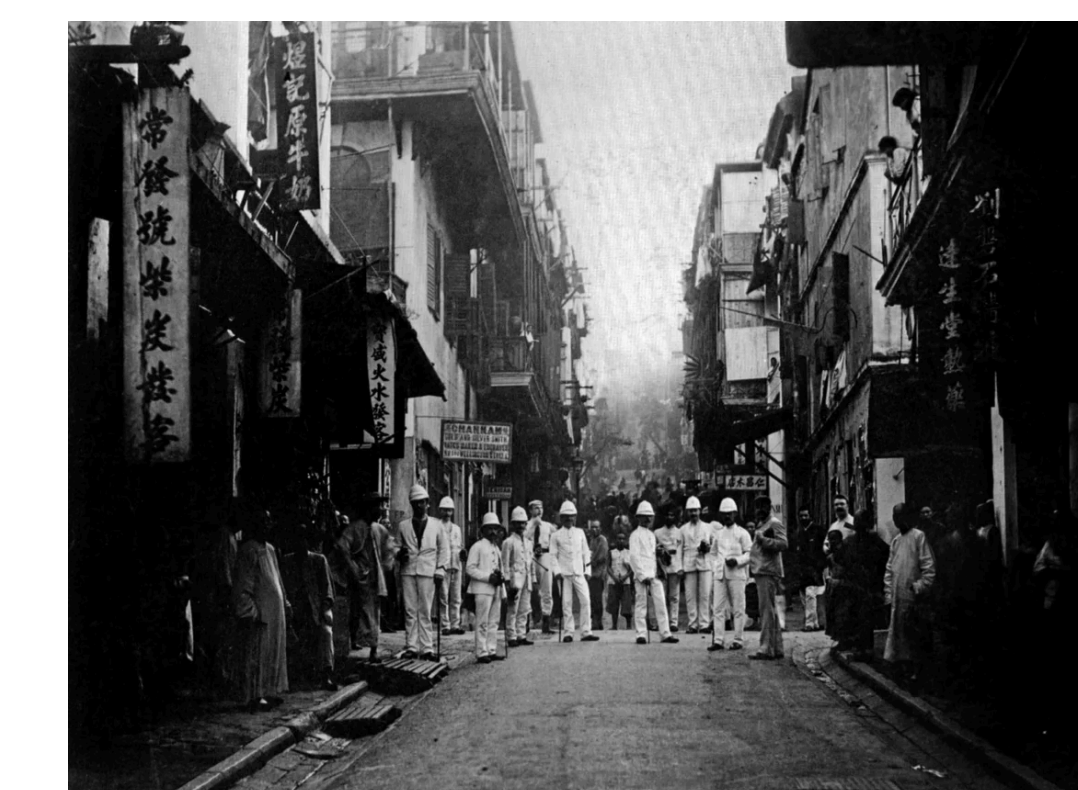


Future Directions

- Functional Analysis of SNPs
- Larger sample sizes (i.e., more and higher-quality samples)
- Collect data specifically to answer this question
- Continued interdisciplinary research, including investigation of the 3rd Plague Pandemic

“If you have not heard about the **‘black plague’ in Canton** very much, you will doubtless hear about it soon ... The doctors are **not inclined to think it infectious**, or at least not very much so. They attribute it rather to **insanitary conditions ...I have not [heard] that a single foreigner has been attacked**, unless possible one Portuguese.”

- Henry Varnum Noyes in a letter to Clara Noyes, May 24, 1894⁷



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