

# ***Dynamics and Molecular Evolution of Influenza***

Objective: To give a presentation of about 40-90 minutes at the end of the week covering the key aspects of influenza from epidemiology to molecular evolution.

The questions and contents below are meant as motivators and need not be followed

## **The Big Questions Are:**

- What is the 3D structure of the Influenza Virus?
- What is the genomic structure of the virus?
- Where does it belong in virus classification?
- How does it function and replicate?
- How widely does it infect in the animal kingdom?
- Why does it come in epidemics instead of constant level infection?
- What are the key parameters of flu infections (infectivity, period of sickness, mortality, ...)?
- What are the closest relatives to the influenza virus?
- Does it have a standard phylogeny?
- By which methods are Influenza annotated?
- Has the 1918 virus been reliably identified?
- How fast does it evolve? Does it recombine? How does selection work on it?

***Recommended literature is only meant to get you started. You might very well be able to find papers more suited for your purpose.***

CHEUNG et al. (2007) Biology of Influenza A Virus Ann. N.Y. Acad. Sci. 1102: 1–25 .

Chang et al. (2007) Influenza Virus Database (IVDB): an integrated information resource and analysis platform for influenza virus research D376–D380 Nucleic Acids Research, Vol. 35, Database issue

Wolf et al. (2006) Long intervals of stasis punctuated by bursts of positive selection in the seasonal evolution of influenza A virus *Biology Direct* , 1:34 doi:10.1186/1745-6150-1-34

Bao et al. (2007) FLAN: a web server for influenza virus genome annotation W280–W284 Nucleic Acids Research, 2007, Vol. 35, Web Server issue

Ferguson et al. (2006) Strategies for mitigating an influenza pandemic Nature Vol 442|248-52

Dowdle (January 2006). "Influenza pandemic periodicity, virus recycling, and the art of risk assessment". *Emerging Infect. Dis.* 12 (1): 34–9.

Tumpey et al. (2009) Resurrected Pandemic of Influenza Viruses □ Annu. Rev. Microbiol. 63:79–98

Obenauer et al. (2006) Large-Scale Sequence Analysis of Avian Influenza Isolates Science 311 1576-80

Kryazhimskiy et al. (2008) Natural Selection for Nucleotide Usage at Synonymous and Nonsynonymous Sites in Influenza A Virus Genes JOURNAL OF VIROLOGY, May 2008, p. 4938–4945 Vol. 82, No. 10

Vana et al. (2008) Origin of the 1918 Spanish influenza virus: A comparative genomic analysis Molecular Phylogenetics and Evolution 47 1100–1110