

# PMI 214 Notes - Lark Coffey

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- Arboviruses can change their hosts (their ranges, etc)
- mechanisms of arboviral emergence
  - urban epidemic
  - enzootic (which can sometimes turn into urban epidemic)
  - rural epizootic
- importance of studying alphaviruses
  - significant human and veterinary pathogens
  - affect medically underserved areas of the world
  - biology relatively poorly studied
  - lack of effective vaccines
  - analgesics (painkillers) are only treatment
  - potential use of bioweapons
- Alphavirus case study: VEEV outbreak in 1992-93
  - VEEV causes significant disease in humans and equines (can kill a horse in about 4-5 days)
  - first isolated in the 1940s
  - This outbreak was in Venezuela
  - Enzootic: uses cotton rats and spiny rats (horses and humans dead end)
  - Epizootic: uses horses (humans dead end)
  - convergent evolution - on 4 different occasions, human and horse infectivity evolved independently
  - a SINGLE base pair change caused the outbreak.. wow
- Alphavirus case study: VEE outbreak in 1993,96
  - Hypothesis 1: VEE virus recently introduced
  - seropositivity increases with age. This tells us the virus had been there for a while.
  - Hypothesis 2: VEE emerged via adaptation
  - some died from fatal encephalitis, but not high enough viremia
  - a single base pair change caused this outbreak too
- Chikungunya, Indian Ocean Islands, 2005-06
  - enzootic: aedes  $\iff$  non-human cycle
  - urban: humans have high enough viremia
  - a single base pair mutation in chik virus affects vector specificity and epidemic potential (mosquito-specific)
- What are the mechanisms of global ZIKV emergence including increased severe human disease?
  - H1: increased vector transmissibility
    - \* Asian lineage strain has *higher* transmissibility, so H1 is disputed?
  - H2: increased human virulence

- \* no evidence for this
- H3: no change in mosquitoes or humans; emergence results from a stochastic effect (more people infected, well-characterized outbreaks)
  - \* Lark's favorite
  - \* possible nobody was looking?
- H4: increased human susceptibility