28 Feb 2022

EVOLUTION of virulence

DEFINITIONS

- virulence ~ loss of host ~~fitness~~
  ~~mortality~~, ~~fecundity~~
  (parasitic CASTRATION)

(not in plant pathology)

↳ ≈ rate of host mortality

resistance: host can prevent infection
OR reduce parasite load

tolerance: host can support infection
without losing fitness

Case mortality:

infection fatality rate (IFR)
case fatality rate (CFR)
ascertainment ratio

parasite-host INTERACTION

- parasite LOAD
  depends on:
  - parasite within-host reproduction rate
  - host clearance — resistance

- pathogenicity - parasite
- tolerance - host

CLASSICAL DOGMA

"parasites evolve to lower virulence"

group selectionist

cheaters

↓

Syphilis ?

1495, Europe

→ New World

- virulence declined rapidly

↳

?

SAMPLING BIAS

~ might not notice mild new parasites

~ biocontrol

TRADEOFF THEORY

- individual hosts usually have low genetic variability in parasite populations

- tradeoff between
  - virulence [mortality rate ~~OR~~ transmission per unit time]
  - and
  - [transmission rate] [days infected] · [infections per day]

mediated by within-host replication rate

↳ kills faster OR provokes clearance (immunopathology)