

standing variation

- what alleles are present
(why are they there?)
 - ↳ NOT very costly
- weakly deleterious in the absence of treatment
- becomes highly advantageous in the presence of treatment

(bacterial evolution)

de novo mutation:

dep on mutation rate
POPULATION SIZE of parasite
generation time.

↳ ~~antibiotic~~ mutational spectrum
viruses

selection differential
BENEFITS. (prob of encountering antibiotics)

COSTS. { energetic costs
reduced efficiency

→ compensatory mutations
↳ reduce costs

BACTERIA, mechanisms

- chemicals that disrupt bacterial metabolism
- SULFA drugs (chemicals)
 - ↳ side products of dye manufacture
 - ↳ FUNGI, BACTERIA.

• Streptomyces.

↳ streptomycin.

↳ penicillin.

antibiotic resistance is also evolutionarily ancient.

• ~~but mobile~~

HORIZONTAL TRANSFER/
mobile elements/
plasmids.

↳ may have evolved more recently?

collateral or non-target selection.

↳ Llewellyn 2017.

'course of antibiotics'