

**Mutations and the nature of the gene**

I. Mutation rates

A. Spontaneous ( $10^{-6}$  –  $10^{-9}$  per gene)

B. Mutagenesis

1. Measuring rates (Basc test) [avg. rate per chromosome =  $-\ln(\text{zero class freq.})$ ]

2. Only ~1/4 of genes can mutate to lethality

3. Only a small fraction of those are cell-lethal (by mosaics)

C. Mutagens

1. Radiation

a. ionizing – breaks

b. UV – inappropriate covalent bonds between neighboring bases

2. Chemicals that react with DNA

a. base analogs

b. alkylating agents

c. intercalating compounds

3. Transposons

III. Mutations

A. transition (pur→pur or pyr→pyr)

B. transversion (pur→pyr or vice-versa)

C. insertion/deletion

D. large-scale changes (from breakage)

IV. T4 rII genes and the nature of the gene

A. complementation and recombination in rII

B. reverting and non-reverting mutations

C. saturation mutagenesis – every site in a gene can mutate

D. gene-protein co-linearity