Lecture 16– gene mutations
I. Gene mutations
   A. Change from wild type
      1. forward mutation

      2. reverse mutation (reversion)

      3. mutation

   B. Types mutations
      1. base-pair substitutions
         a. at DNA level
            i. transition
            \[ T \rightarrow C, C \rightarrow T, A \rightarrow G, G \rightarrow A \]
            ii. transversion
            \[ T \rightarrow A, T \rightarrow G, C \rightarrow A, C \rightarrow G \]
            A \rightarrow T, G \rightarrow T, A \rightarrow C, G \rightarrow C
         b. at protein level
            i. silent mutation
            ii. synonymous mutation
            iii. conservative mutation
            iv. missense mutation
            v. nonsense mutation

      2. frameshift

   C. Molecular basis of mutation
      - examples

- examples
II. Somatic vs germ line
   A. somatic mutation
      1. if in dividing cells
         - recessive
         - dominant
         - the earlier in development the mutation arises, the larger the mutant sector will be
      2. if in non-dividing cells
         - most likely to have little or no effect
         - an exception is cancerous mutation
      3. can somatic mutation be passed to progeny?
         - note that in plants germ line produced by somatic cells
   B. germ line mutation

III. Mutant types
   A. loss-of-function (null) - null = no gene function
   B. gain-of-function - generally dominant
   C. 3rd type of dominant mutation: dominant negative

IV. Are mutations induced by selective conditions?
   A. mutations are relatively random events
      - some mutations adaptive – permit under selective conditions (eg. resistance)
   B. pre-existing mutations are selected for
      - several experiments showed that mutations already present in population
How was this demonstrated?
- Replica plate (lederberg)

C. spontaneous mutation rates
1. *E. coli*

2. *Drosophila yellow*

3. human