MIDTERM – MON OCT 7

- ***7:30-8:30pm: Adams Auditorium - A to Letic***
  Maass 112 - Leung to Z
- ***Bring ID card***
- ***Bring pencil to fill in Scantron form***
  - ***Lectures 1-9 (up to Tues– Genes, Proteins & Gene Regulation)***
  - ***Worth 20% of grade***
  - ***30 questions***
    - ***2/3 multiple choice***
    - ***1/3 short answer (one word to one sentence)***
- ***Help with material***
  - ***TW office hours after class Tues/Thurs 1:30-2:30***
  - ***Tutorials : Wed 4:00-5:30 – Stewart S4/106***
    Thurs 2:30-4:00 – Stewart S2/2
  - ***Online Discussion forum to ask questions***
  - ***QUESTIONS AT END OF CLASS (TIME ALLOWING)***

1. Which of the following is NOT a fundamental similarity between prokaryotes and eukaryotes?

(a) Outer cell membrane
(b) Protein synthesis on ribosomes
(c) Presence of DNA
(d) Presence of cytoplasm
(e) Presence of peptidoglycan cell walls

2. If a herbicide is designed to inhibit photosynthesis just before the Calvin cycle, what final product of photosynthesis would NOT be generated?

(a) Water
(b) Oxygen
(c) Glucose
(d) Carbon dioxide
(e) Chlorophyll

3. Why are fats a better long term storage molecule than polysaccharides in animals?

(a) Fats are more stable than polysaccharides
(b) Fats yield more energy per unit weight due to more high-energy C-H bonds
(c) Polysaccharides require more energy to be broken down than fats
(d) Fats yield more energy during glycolysis than sugars
(e) Animals cannot make large polysaccharides

4. Lynn Margulis published a paper in 1966 that led to the 'Endosymbiotic Theory'. Which of the following statements reflects that theory?

(a) Mitochondria are derived from anaerobic bacteria

(b) The nucleus is derived from the engulfment of a fungal cell that was digested except for its nucleus

(c) The nucleus is derived from invaginations of the plasma membrane

(d) Chloroplasts are derived from photosynthetic bacteria

(e) The endomembrane systems (endoplasmic reticulum, Golgi, etc) derived from a symbiosis between an ancient eukaryote and an archae

5. From which cellular organelle do secretory vesicles destined for both exocytosis and lysosomes arise?

(a) Nucleus

(b) Microtubules

(c) Plasma membrane

(d) Centrosome

(e) Golgi complex

→ everything is eventually lost to chaos → lost to heat

6. An example of entropy is:

(a) Living systems — No → there are order

(b) A rock poised at the top of a hill — potential E

(c) A concentration gradient — potential E

(d) Loss of energy as heat during energy conversions → entropy

7. Which has the largest number of different types of subunits?

(a) DNA → 4 nucleotides

(b) Cellulose *

(c) Proteins — 20 diff AA

(d) Glycogen * → all polymers of glucose

(e) Starch *

8. Below is the <u>template strand</u> of DNA for a portion of a gene. What is the corresponding mRNA based on this DNA sequence?

ATG CTA GGC AAA GCG TTG CAA GCC ACT

UACGUU

template → complementary to mRNA

(mRNA made by pairing RNA nucleotides with template DNA)

(a) ATG CTA GGC AAA GCG TTG CAA GCC ACT

(b) AUG CUA GGC AAA GCG UUG CAA GCC ACU

(c) TAC GAT CCG TTT CGC AAC GTT CGG TGA

(d) UAC GAU CCG UUU CGC AAC GUU CGG UGA

(e) TUC GUT CCG TTT CGC UUC GTT CGG TGU

9. What aspect of DNA structure makes DNA replication elegantly simple?

(a) Complementary base-pairing

(b) Formation of a double helix

(c) Presence of the bases on the inside and sugar-phosphates on the outside

(d) Having 2 purine and 2 pyramidine bases

(e) The two strands running anti-parallel to each other

10. Which of the following statements about translation is true?

(a) tRNA have codons that are complementary to the anti-codons found on mRNA F mRNA-codon tRNA-anti

(b) Most amino acids have multiple codons that specify their insertion into a growing protein

(c) There are two common start codons: AAA and AAG, both of which code for lysine F start = Met = AUG

(d) Ribosomes are constructed only of proteins F protein + rRNA

(e) Only one ribosome at a time can translate a particular mRNA F

11. Sally just had a baby girl. She insists that her husband Joe is the father, Sally's ex-boyfriend William claims that he is the father. Paternity testing gives the following results:

What conclusions can be drawn?

(a) Joe is the father
(b) William is the father
(c) Both Joe & William could be the father
(d) Neither Joe nor William could be the father
(e) Sally could not be the child's mother

12. While watching the latest CSI spinoff (CSI: Montreal), you notice the crime scene techs going through the following steps & notice that one is inconsistent with modern techniques.

#1 - Collect swabs of cells and/or bodily fluids from the crime scene, evidence, the victim and suspects

#2 - Isolate DNA from the collected samples

#3 - Perform PCR on the DNA

#4 - Run a database search on CODIS, showing graphics of DNA fingerprinting gel bands flashing across the screen

#5 - Announce to the the lead CSI there is not a current match, but that the perpetrator was a female

What did you notice?

(a) Step 2 is wrong since it is no longer necessary to isolate DNA to do DNA profiling F

(b) Step 3 is wrong – PCR is not used for DNA profiling, rather DNA needs to be digested, run on a gel and a radioactive probe to the repeats used to identify the banding patterns F (not modern way)

(c) Step 4 is wrong – the electropherograms currently in use have number-labeled peaks that are used for matching samples T - DNA gels with bands = old way

(d) Step 5 is wrong – DNA profiling gives no information as to the sex of the person in question F - can tell sex - have specific primers to generate sex-specific bands

(e) Steps 2 and 4 are both wrong for the reasons listed above F