Take Home Exam 4 Answers.

QUESTION 1

A monophyletic group of organisms that is defined by which of the following?

A. synapomorpy
B. autapomorphy
C. paraphyly
D. polyphyly
E. symplesiomorpy
F. homoplasy

QUESTION 2

A paraphyletic group of organisms that is defined by which of the following?

A. synapomorpy
B. autapomorphy
C. paraphyly
D. polyphyly
E. symplesiomorpy
F. homoplasy

QUESTION 3

A polyphyletic group of organisms that is defined by which of the following?

A. synapomorpy
B. autapomorphy
C. paraphyly
D. polyphyly
E. symplesiomorpy
F. homoplasy

QUESTION 4

According the Willi Hennig's approach to define propper taxonomic groups based on shared ancestry, the prokaryotes are a paraphyletic group. Which of the following were in favor of abolishing "prokaryotes" as a name for a group of organisms? (multiple answers)

Carl Woese
Norm Pace
Ernst Mayr
Lynn Margulis

QUESTION 5

According to Hennig a natural taxonomy should be based on which of the following?

A. shared primitive characters.
B. shared derived characters.
C. homoplasies.
D. non-shared derived characters.
E. None of the above.

QUESTION 6

According to the currently favored version of the tree of life, which are the closest relative of the Archaea?

A. Bacteria
B. Viruses
C. Eukaryotic nucleoctoplasm
D. Archaeabacteria
E. Eukaryotic endosymbionts

QUESTION 7

Birds and bees both have wings. Which of the following is true?

A. Wings are a homoplasy and a group comprised of birds and bees is a polyphyletic group
B. Wings are a synapomorphy and a group comprised of birds and bees is a monophyletic group
C. Wings are a homoplasy and a group comprised of birds and bees is a paraphyletic group
D. Wings are a symplesiomorphy and a group comprised of birds and bees is a paraphyletic group

QUESTION 8

Which of the following is an advantage of using the Coral of Life as a description for life's evolution? (Multiple correct answers)

A. Fan shaped coral have bifurcating and fusing lineages. These could represent speciation events and the fusion between divergent lineages, respecitvely.
B. The Coral of Life explicitly considers extinct lineages.
C. In a stone coral the living cells sit on top of the remnants of their dead ancestors. This is similar in evolution, where only the extant species are alive, whereas the lineages leading to them are constituted by dead ancestors.

QUESTION 9

What is GC strand bias?

A. There are more GC nucleotide pair simple repeats near the origin.
B. The CG versus AT content of a genome changes over time due to the mutation bias.
C. The G versus C content of the leading is different from the G versus C content lagging strand.
D. None of the above.

QUESTION 10

Give a few examples (at least 3) of eukaryotic algae becoming endosymbionts in other eukaryotic cells. Give the name of the host, and the name of the symbiont in parenthesis, if known, else a question mark.

Euglena gracilis (green algae)
Cryptomomans (red algae)
Chlorachniophytes (green algae)
Coral polyps (dinoflagelates (red algae))
Haptophytes (red algae)
Vaucheria litorea (red algae) – also the source for the kleptoplastids in the sea slug Elysia chlorotica

QUESTION 11

How are evolutionary relationships between genomes best represented?

A. web-like diagrams
B. tree-like diagrams
C. Venn diagrams
D. Klenow diagrams

QUESTION 12

The leading and lagging strand in a bacterial circular chromosome (multiple answers)

A. usually have different nucleotide comoposition
B. differ in the number of genes that are transcribed from the strand into mRNA
C. have different length, which makes replication of one strand faster, which necessitates the replication machinery to wait until the other stand is completely replicated
D. contain strand specific oligo nucleotide sequence motifs that tell the replication machinery when to slow down because the terminus of replication is near

QUESTION 13

Mitochondial Eve lived:

A. 3.2-4.2 million years ago
B. 750,000 years ago
C. 166-249 thousand years ago
D. 10 thousand years ago
E. 90-100 thousand years ago

QUESTION 14

The ancestors of modern humans left Africa around 100,000 - 70,000 years ago. Which of the following is true:

A. Relatives of modern humans (Neanderthals and Denisovians) have left Africa much earlier (about 700,000 years BC) and populated Europe, Asia and possibly Australia.
B. Neanderthal and Denisovian humans were replaced by modern humans coming out of Africa. The earlier European and Asian humans vanished without a trace.
C. Different types of humans (modern humans, Neanderthal and Denisovian and other archaic types that stayed in Africa) coexisted and interbred for a long time. This is reflected in Neanderthal and Denisovian DNA found in today's human populations.
D. Cultural barriers and biological post-mating barriers prevented gene flow between the different human populations.

QUESTION 15

Terrestrial tetrapods evolved from within the bony fish. Which of the following is true of a group of all of the bony fish, excluding terrestrial tetrapods?

A. It is a grade
B. It is a paraphyletic group
C. It is NOT a proper taxonomic unit
D. All of the above

QUESTION 16

A cladogram can define clades in the absence of any information on the root just from unpolarized character changes.

True **False**

QUESTION 17

True/False There are many unrelated Eukaryotes that acquired the ability to photosynthesize by capturing as an endosymbiont an Eukaryote with a plastid endosymbiont. This is called secondary endosymbiosis.

True False

QUESTION 18

True/False Plastids are descended from free living Cyanobacteria (also sometimes called blue green algae).

True False

QUESTION 19

What may cause the difference between the leading and the lagging strands in Bacterial chromosomes?

A. Coding sequences tend to have a different composition than the complementary strand
B. There are sequence tags in the genome that tell the DNA polymerase when to stop
C. Most genes are coded in the same direction as replication, so that the RNA polymerase doesn't interfere with the DNA polymerase by going in the opposite direction
D. All of the above

QUESTION 20

Which is the most abundant oxygenic photoautotroph in the ocean?

Thermotoga
Halobacterium
Prochlorococcus
Synechococcus

QUESTION 21

Which of the following is true regarding HGT?

A. It is a process through which genes enter a genome, without being inherited parentally
B. It can lead to important biological innovations
C. A transferred gene can be inherited parentally, so that a clade of organisms all share the same inherited ancient HGT.
D. It is more common in Bacteria than in humans (considering only the human genome, no the hologenome).
E. All of the above.

QUESTION 22

Which of the following statements on strand bias is true?

A. G pairs with C and A with T, therefore you only can have a strandbias with respect to A over C but not with respect to G versus C

B. Strand bias may be caused by more genes encoded on the leading than of the lagging strand

C. **Stand bias can be used to roughly locate the origin and terminus of replication in a bacterial genome**

D. **AIMS show a strand bias with respect to the leading and lagging strand in addition to a frequency gradient along the chromosome.**

E. Stand bias reflect a violation of the base pairing rules.

QUESTION 23

Which organisms constitute the archaeplastida?

A. Red, Green, and Brown Algae

B. All photosynthetic Eukarya

C. Glaucophytes, Red Algae, Green Algae (I & II), and Plants

D. Everything that has a Red Algae endosymbiont

E. Everything that has a Green Algae endosymbiont

QUESTION 24

Within chromosome recombination events most frequently occur between point that are equidistant from the origin of replication. The reason for this may be that

A. Recombination between point that are equidistant from the origin of replication does not place genome architecture imparting sequences in the wrong position or orientation relative to the origin and terminus of replication

B. Does not destroy the stand bias with respect to the number of ORF encoded on the leading strand

C. Recombination occurs at particular motifs that are at the corresponding location relative to the origin of replication

D. Recombination occurs at the same time as replication