Midterm exam #2 Take-home questions MB 451 Microbial Diversity

The rules: You are free to use any notes, books, or online material while taking this take-home exam. You are NOT allowed to get (or give) help of any kind from (or to) anybody. If you have questions about the exam, send an email to Dr. Brown at james_brown@ncsu.edu. You MUST turn this completed take-home portion of the exam in with the rest of the exam when you take it, unless you take the exam in the DELTA offices, in which case you need to turn it in at my office or mailbox.

Honor pledge: "*I have neither given nor received unauthorized aid on this test.*"

Signed : _____ Date : _____

Name : _____

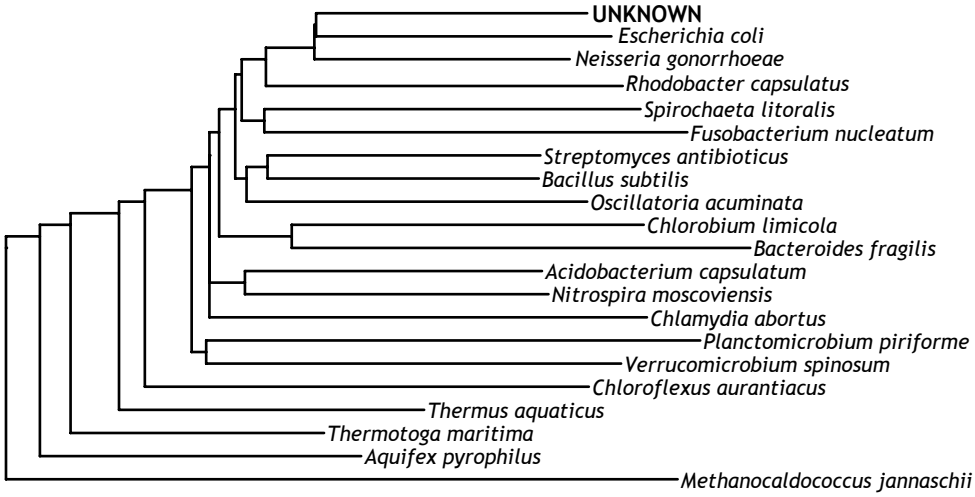
1. For each of the phylogenetic groups listed, provide the name of one organism (genus, or genus and species) in that group, and something interesting/important about that genus (or species) (½ point each item, 20 points total):

Phylogenetic group	Genus	Something about it
Crenarchaea		
Unikonts		
Chlamydiae		
Planctomycetes		
ß-proteobacteria		
Firmicutes		
δ-proteobacteria		
Actinobacteria		

1. (continued)

Phylogenetic group	Genus	Something about it
Spirochaetes		
Thermotogae		
Euryarchaea		
Bacteroids		
Deinococci		
Excavates		
Rhizaria		
Chlorobi		
α-proteobacteria		
Chloroflexi		
γ-proteobacteria		
Cyanobacteria		

2. You have isolated an unknown organism in lab. You've misplaced your notes, and your plates, so you don't know anything about it. But your ssu-rRNA PCR was successful, and you have good sequence data. From this sequence, you generate the following tree:



How specifically can you identify this organism? (List it's specific Domain, Kingdom, Phylum, Class, Order, Family, Genus or Species)

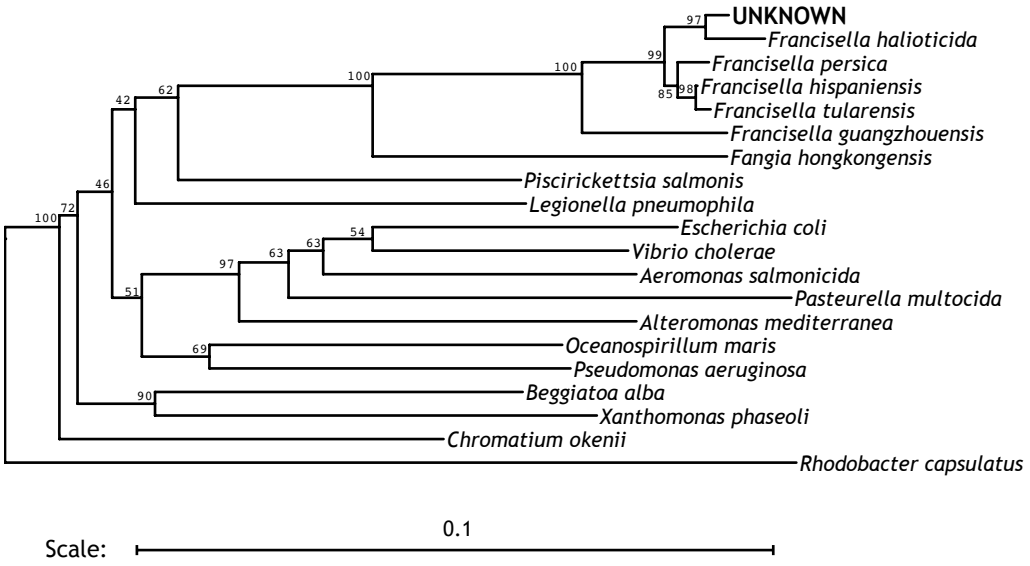
2.1.

List 4 things you *can* or *can't* predict with reasonable confidence about this organism (2 points each). Common features of Bacteria, or life in general, will not accepted, e.g. "it has DNA", "it doesn't have Golgi", or "don't know what country it comes from". They need to be specific, testable predictions about the properties of the organism.

Hint : If it tree'ed out as a mammal, you could predict it had a bony skeleton and at least some hair, but unless it tree'ed specifically out with a particular group, you couldn't predict it whether it was a carnivore or herbivore, or how big it is.

2.2.
2.3.
2.4.
2.5.

3. Based on the placement of this organism in the previous tree, you create a more detailed tree:



Scale: 0.1

How specifically can you identify this organism now? (List it's specific Domain, Kingdom, Phylum, Class, Order, Family, Genus or Species)

3.1.

List 4 new things you *can* or *can't* predict with reasonable confidence about this organism that you couldn't before (i.e. from the previous tree) (2 points each). Common features of Bacteria, or life in general, will not accepted, e.g. "it has DNA", "it doesn't have Golgi", or "don't know what country it comes from". They need to be specific, testable predictions about the properties of the organism.

3.2.
3.3.
3.4.
3.5.

4. Both Chloroflexi and Chlorobi use electrons from sulfide or hydrogen to generate reducing power (NADH, NADPH, $FADH_2$, reduced ferridoxin, this sort of thing) for carbon fixation. Compare and contrast the mechanisms by which these two kinds of organisms generate this reducing power. Do NOT describe carbon fixation, this isn't the question. What are the advantages and disadvantages of each? Use your own words to demonstrate that you actually understand this. (10 points)