One of the goals of our DNA sequencing exercise, along with giving you first-hand experience in how it is done and how the data is manipulated, is to demonstrate the concept that ‘phenotype’ can be inferred by ‘genotype’. That is, analyzing an organism’s genome can provide insights into its characteristics before you even observe those characteristics. That’s not to say that identifying some gene means that the organism will necessarily express that gene under a given set of environmental conditions (or maybe even at all), but it does indicate what an organism is potentially capable of doing and can serve as a launching point for studies of phenotypic traits. *This is a fundamental change in the way the study of biology is pursued* that has occurred in just the last few years. Instead of observing biological traits and searching for the gene(s) responsible; we now identify the gene (indeed, the whole genome) and search for when and how the corresponding trait is expressed.

As an example, it is not uncommon to analyze a microbial community molecularly (i.e. comparative rRNA sequence analysis) and use that data to then select the culture conditions most likely to isolate the identified community members.

In this worksheet you are going to use your DNA sequence data to infer (i.e make an educated guess—your inferences would subsequently need to be corroborated empirically) the characteristics of the bacterium from which your DNA sequences came and what culture conditions you might use to try to isolate the organism.

**Most of you got an rRNA gene.** You will use the BLAST results of your consensus sequence to identify your organism (well, actually, find the *most similar sequence* in the database) and then research the literature for that organism to describe its important characteristics by answering the questions below.

**If you got a functional gene,** you can already infer one of its traits! When you BLAST it, it will tell you what gene it is and which bacterium the most similar hit came from. Just use that organism to answer the questions.

**To be included with the completed worksheet:**

1) a printout of your consensus sequence (2 pts)
2) the first three pages of your BLAST results. (2 pts)
3) cite sources of our answers for each of the questions below (1 pt per question).

**Sources for bacterial taxonomic information:**

The following resources will probably be the most efficient places to track down the answers to the worksheet questions:

1) *Bergey’s Manual of Systematic Bacteriology.* This book is available from the library in the BPS building.
2) *The Prokaryotes.* Hardcopy version also available in the BPS library
3) *The Prokaryotes.* Electronic version is available through the electronic texts section of the MSU library website.
4) If information is not in any of the above resources, the organism (or at least taxonomic name) is probably too new to have made it into the texts. In that case you need to go to the primary literature. Search *PubMed at NCBI* ([http://www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)).
5) A good way to find the primary, descriptive articles for a particular organism is to go to *DSM, the german culture collection* ([http://www.dsmz.de](http://www.dsmz.de)) and search their collection for the organism. If they have it, go to the type strain’s accession and find the references associated with it. You can try the same at the ATCC, the American Type Culture Collection, ([http://www.atcc.org](http://www.atcc.org)).
**Important characteristics of your organism (1 pt each):**

1) What is the cellular morphology (shape) of your organism?  Source of info?

2) What is its Gram reaction?  Source of info?

3) Describe the colony morphology of your organism?  Source of info?

4) What habitat(s) is it found in? Source of info?

5) What is its relation to oxygen (i.e. Is it aerobic, facultatively anaerobic, obligately anaerobic?)  Source of info?

6) What is its optimum pH and temperature?  Source of info?

7) What carbon sources does it use (max of 5 favorite)?  Source of info?

8) What does it use as electron acceptors?  Source of info?