

Group #: _____

Section #: _____

Name: _____

Assessing the influence of environment on morphology in rainbow trout (*Oncorhynchus mykiss*)

Introduction: Historically, biologists believed that the whole of an organisms' outward appearance was determined by the genes it inherits from its parents, and that environmental influences acted primarily on whole populations through natural selection. However, relatively recent evidence suggests that the external environment can have a large influence on phenotypic traits by influencing the timing and degree of gene expression. There are a multitude of ways in which the environment can influence gene expression. Genes can be turned on or off, which can upregulate or downregulate the production of proteins, hormones, and cellular machinery, which influence a variety of cellular processes. While the environment continues to influence gene expression throughout an organisms' life it seems to have the largest influence during the period of early development.

Objectives: We will be comparing internal organ sizes between wild and hatchery rainbow trout to see if dietary differences during early development influence relative organ size and digestive system morphology. Specifically, we are going to remove and measure the mass of the fish's heart and liver, and count the number of pyloric caeca.

Instructions: All students need to wear gloves and goggles during dissections, and when finished, wash hands, dissection instruments, trays, and benches.

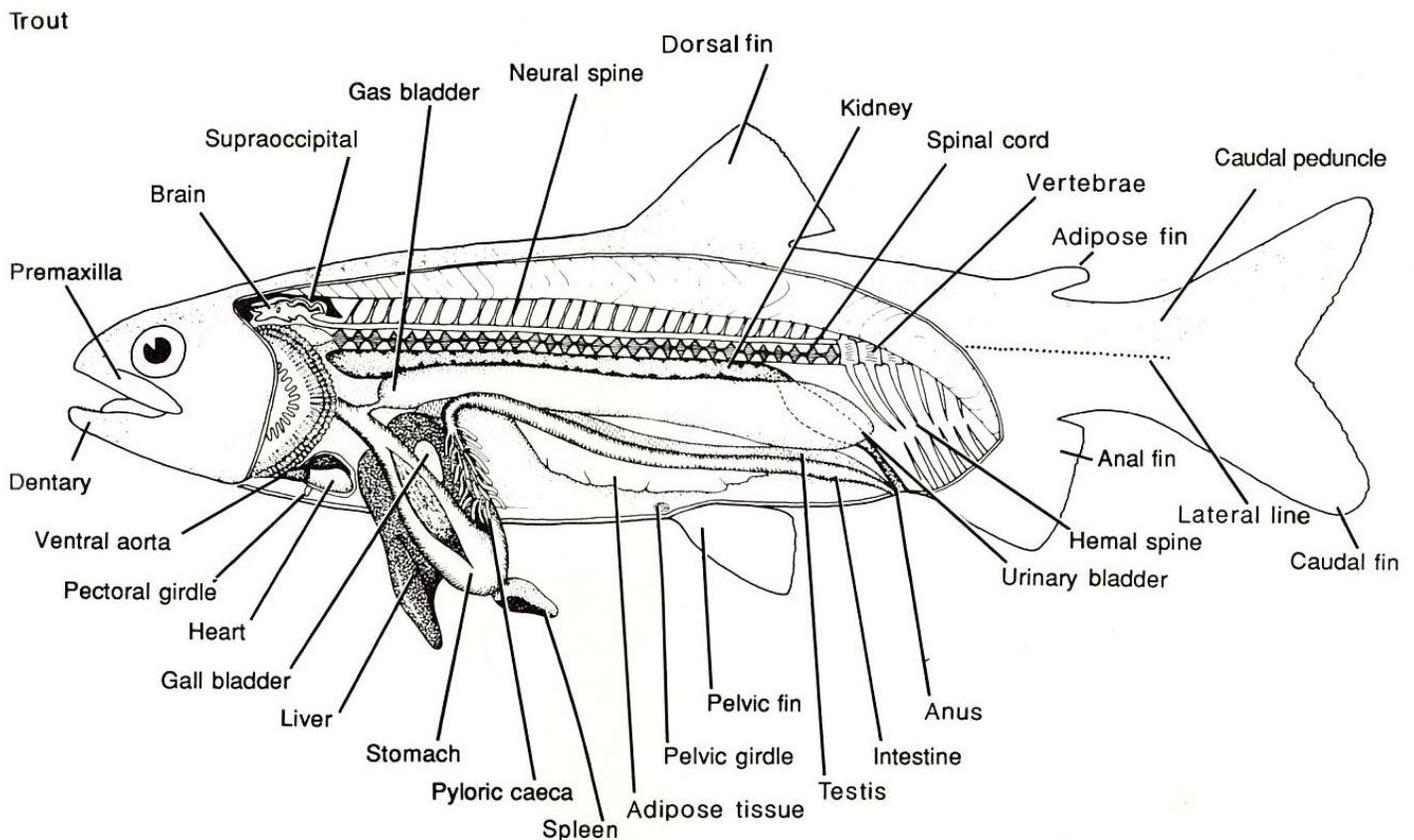


Figure 1: Trout internal anatomy. Use this diagram to help orient yourself as you dissect your trout.

1. Develop a hypothesis that can be answered using the data we will collect from our dissections.

2. Develop a prediction (what do you expect to see in the data?)

Table 1: Record the data from your group's fish here. Once you are done, enter this data into the instructor's master data sheet.

H / W	Fish Length (mm)	Fish Mass (g)	Liver mass (g)	Heart mass (g)	Pyloric caeca count

3. Why do we need to account for the body size of the fish?

4. Aside from diet, what other environmental factors do you think could influence trout morphology?

5. Expand on you answer from question 4 and predict **how** those environmental influences could influence trout morphology.
