Name_____

DATA Nugget

Time flies when you turn up the heat

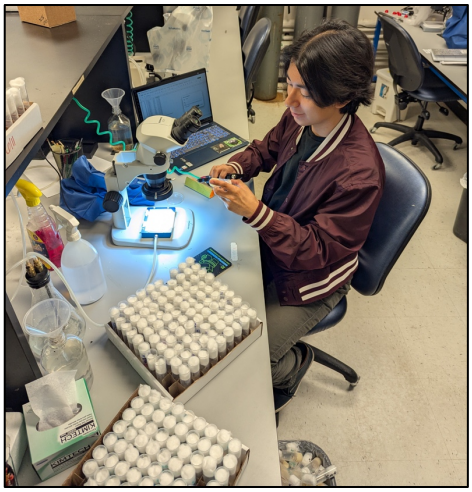
Featured scientist: The Richard Meisel lab at the University of Houston

Research Background:

Aging is a natural process that happens in all living things. As organisms get older, their cells and DNA slowly become damaged. Some of this wear and tear happens naturally as cells do their jobs. Other damage can be brought on by stressful environmental conditions, such as high temperatures.

Richard is a scientist interested in factors that affect aging. He is curious about why some individuals of the same species live longer than others. Similarly, some individuals reach maturity faster, or in other words, have shorter **development time**. These topics can be tricky to study because **lifespan**, or how long an organism lives, can take a long time to observe. For this reason, Richard studies aging in flies. Flies are especially useful for questions like these because they are small, easy to raise, and have short life cycles. This allows researchers to study growth, development, and aging in a short amount of time.

To start, Richard, along with members of his lab, wanted to look at how temperature affects development time and lifespan. Every organism has a range of temperatures where it grows and functions best. If the environment is much warmer or colder than that range, it can cause stress. Temperature also affects how quickly many biological processes happen. For example, in warmer temperatures, metabolism, or the process of turning food into energy, usually speeds up. Because of this, young organisms often grow and develop faster in warmer conditions. Faster development and metabolism can cause cell damage to build up more quickly.



A lab member recording data on the fruit fly population.

Richard's lab includes scientists at all stages – from undergraduates to graduate students, and researchers who already have advanced degrees. They worked together to investigate how temperature affects the development time and lifespan in a fruit fly species. They knew from previous studies that female fruit flies usually live

longer than males. Richard's lab wanted to build on past work and figure out how temperature affects this pattern.

To test the effects of temperature, the research team raised fruit flies in two conditions: 18°C and 22°C. Female flies laid eggs, each in their own container, and the eggs were allowed to develop. Each day, the team recorded when adult flies emerged from their pupal cases and whether they were male or female. Development time was measured as the number of days it took each fly to grow from an egg into an adult.

After the flies emerged, they were moved to a separate container and kept at the same temperature treatment. This ensured the team could keep track of how long each fly lived. The adult flies were all given the same food and kept at the temperatures that they were raised in. Each day, members of the team would carefully check each vial and look for deaths. By knowing the dates that each fly had emerged as an adult and their death date, they could calculate lifespan. Throughout his experiment, the team measured lifespan and development time in thousands of male and female fruit flies!

Scientific Questions: How does temperature affect development time and lifespan in a fruit fly species? Are there differences between males and females?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

Left: Each fruit fly is placed in their own container that is labeled with an assigned ID number, their sex, and the date they emerged as an adult. Right: The containers with fruit flies are kept in incubators set to either 18°C or 22°C.

Name_____

Scientific Data:

Use the data below to answer the scientific question:

Temperature treatment (degrees Celsius)	**Sex**	**Average development time** (days)	**Average lifespan** (days)
18	Male	22.4	43.8
18	Female	21.9	56.9
22	Male	17.6	24.9
22	Female	17.1	32.7

What data will you graph to answer the questions?

Independent variables: _____

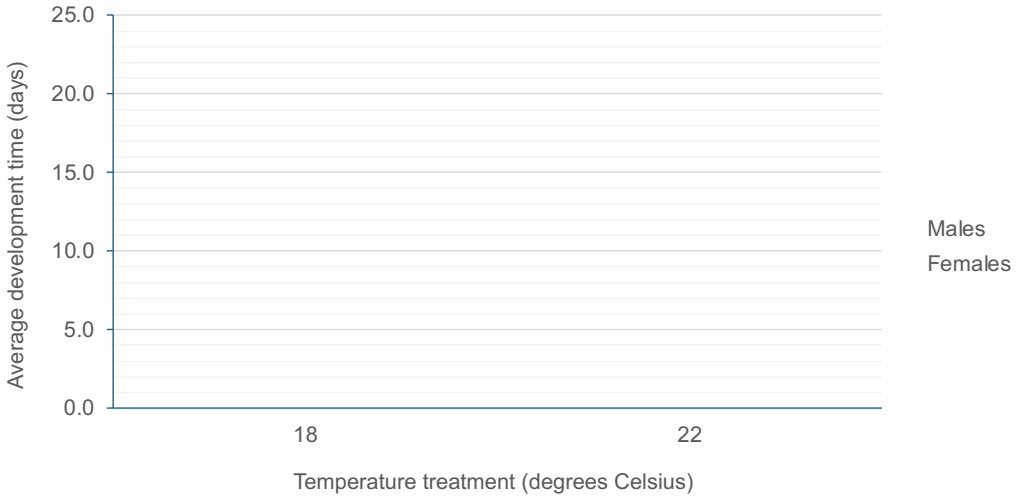
_____

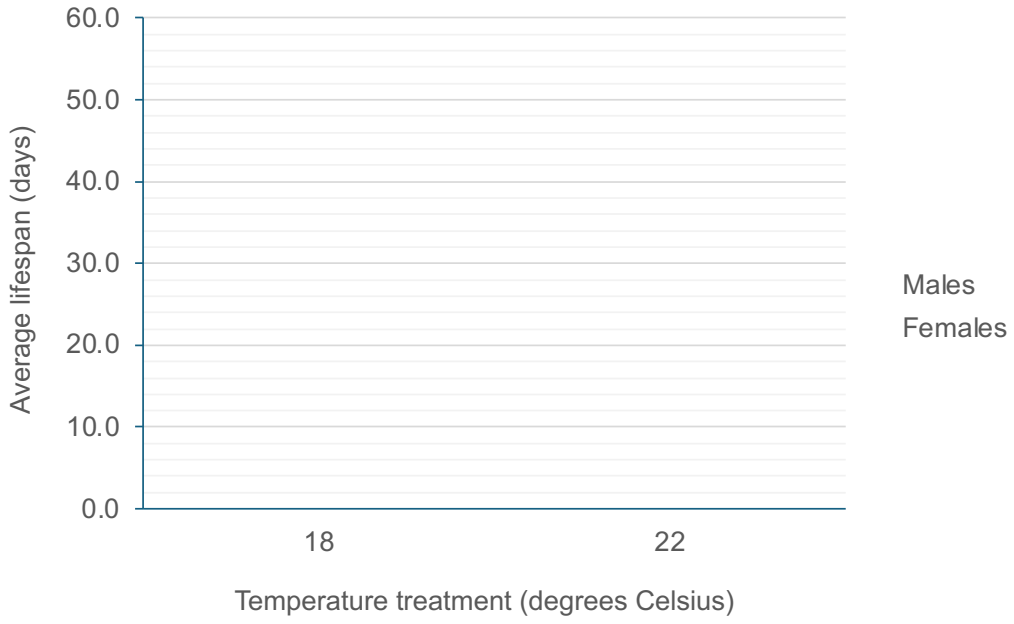
Dependent variables: _____

_____

Draw your graphs below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see and write one sentence describing what you see next to each arrow.

Name_____





Interpret the data:

Make a claim that answers the scientific questions: How does temperature affect development time and lifespan in a fruit fly species? Are there differences between males and females?

Name_____

What evidence was used to write your claim? Reference specific parts of the table or graph.

Name_____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about how temperature accelerates biological processes.

Did the data support Richard and his lab's hypothesis? Use evidence to explain why or why not. If you feel the data are inconclusive, explain why.

Your next steps as a scientist: Science is an ongoing process. What new question(s) should be investigated to build on Richard and his lab's research? How do your questions build on the research that has already been done?