



# EDIBLE INSECT PROJECT

Mealworm Experiment

# Mealworm Background

What is a mealworm?



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# Mealworm Background

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- Mealworms are the larval form of the darkling beetle, *Tenebrio molitor*. They grow to about 2.5 cm long.
- They originated in Africa but have been naturalized all over the world.

# Mealworm Background

What is a mealworm?



- They are raised as fish bait

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- They are raised as fish bait, animal feed

# Mealworm Background

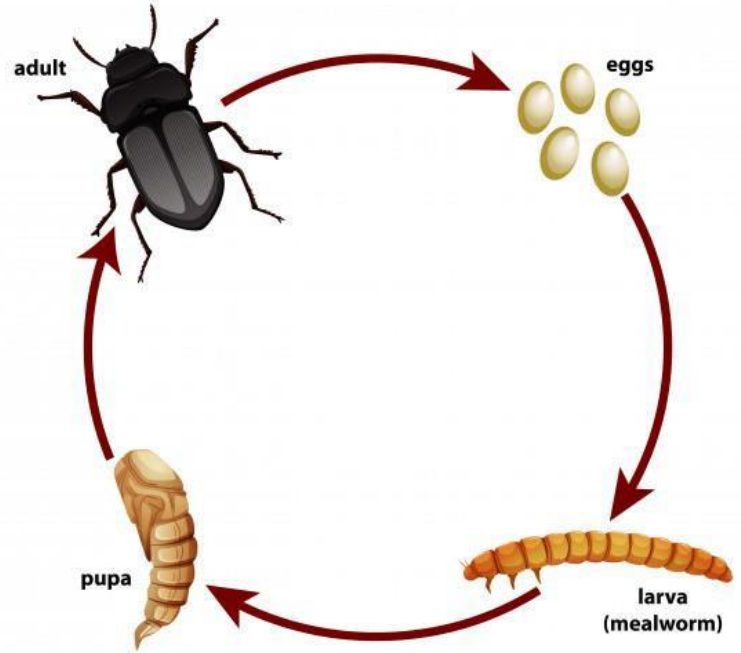
What is a mealworm?



- They are raised as fish bait, animal feed and for food.

# Mealworm Life Cycle

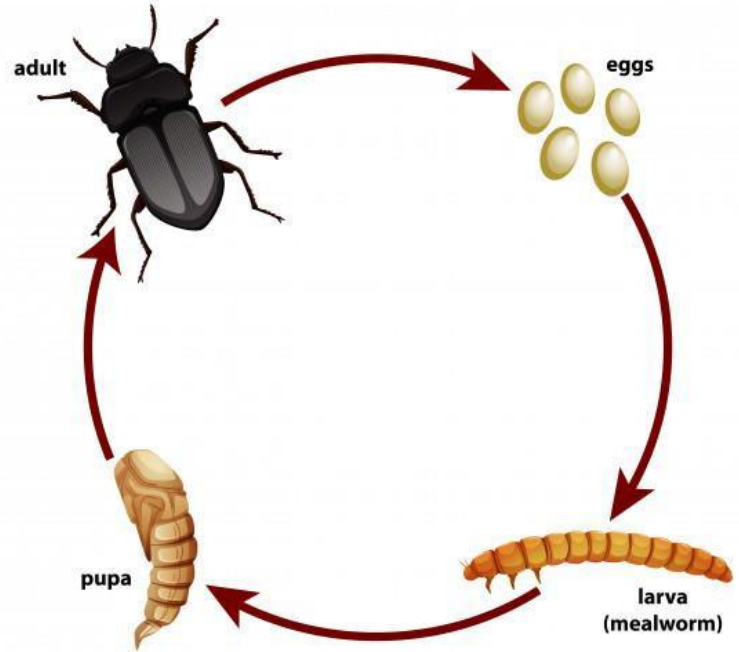
## Darkling Beetle Life Cycle



# Mealworm Life Cycle

- Life Stages:
  - Egg (4-7 days)

## Darkling Beetle Life Cycle



# Mealworm Life Cycle

- Life Stages:
  - Egg (4-7 days)
  - Larva (10 weeks)



Large 3/4" - 1"



Medium 1/2" - 3/4"

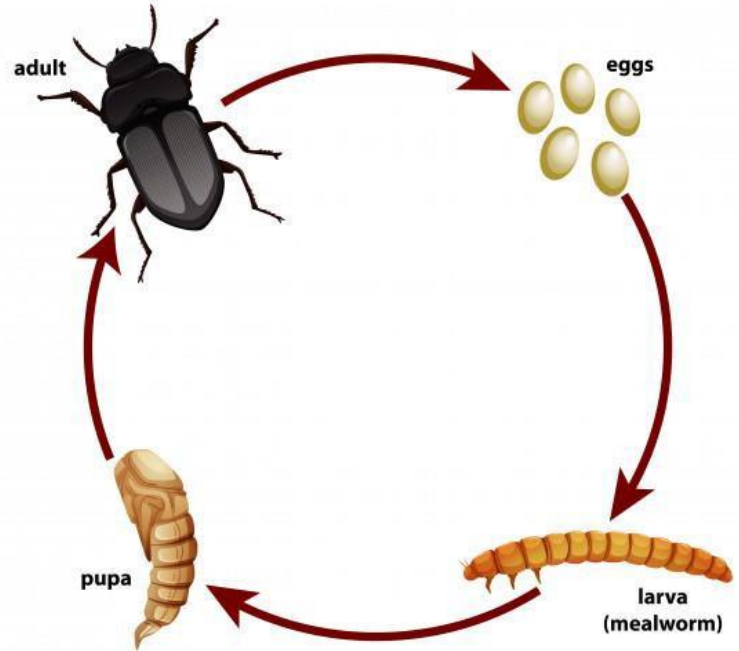


Small 1/4" - 1/2"



Mini 1/4"

## Darkling Beetle Life Cycle

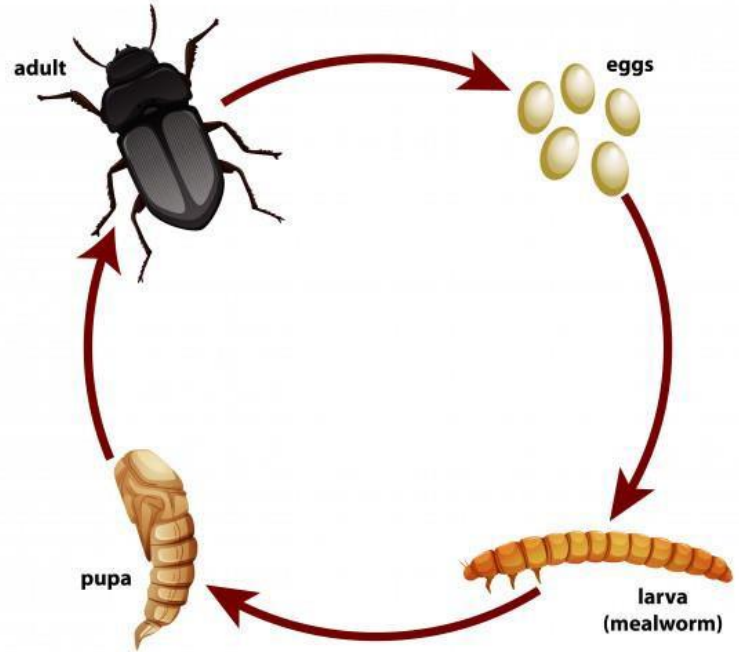


# Mealworm Life Cycle

- Life Stages:
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  - Larva (10 weeks)
  - Pupa (6-18 days)



## Darkling Beetle Life Cycle

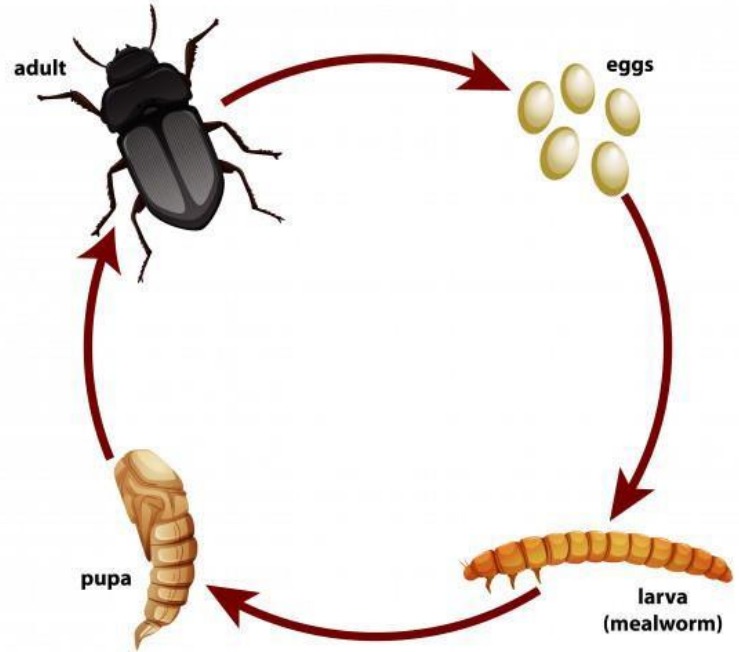


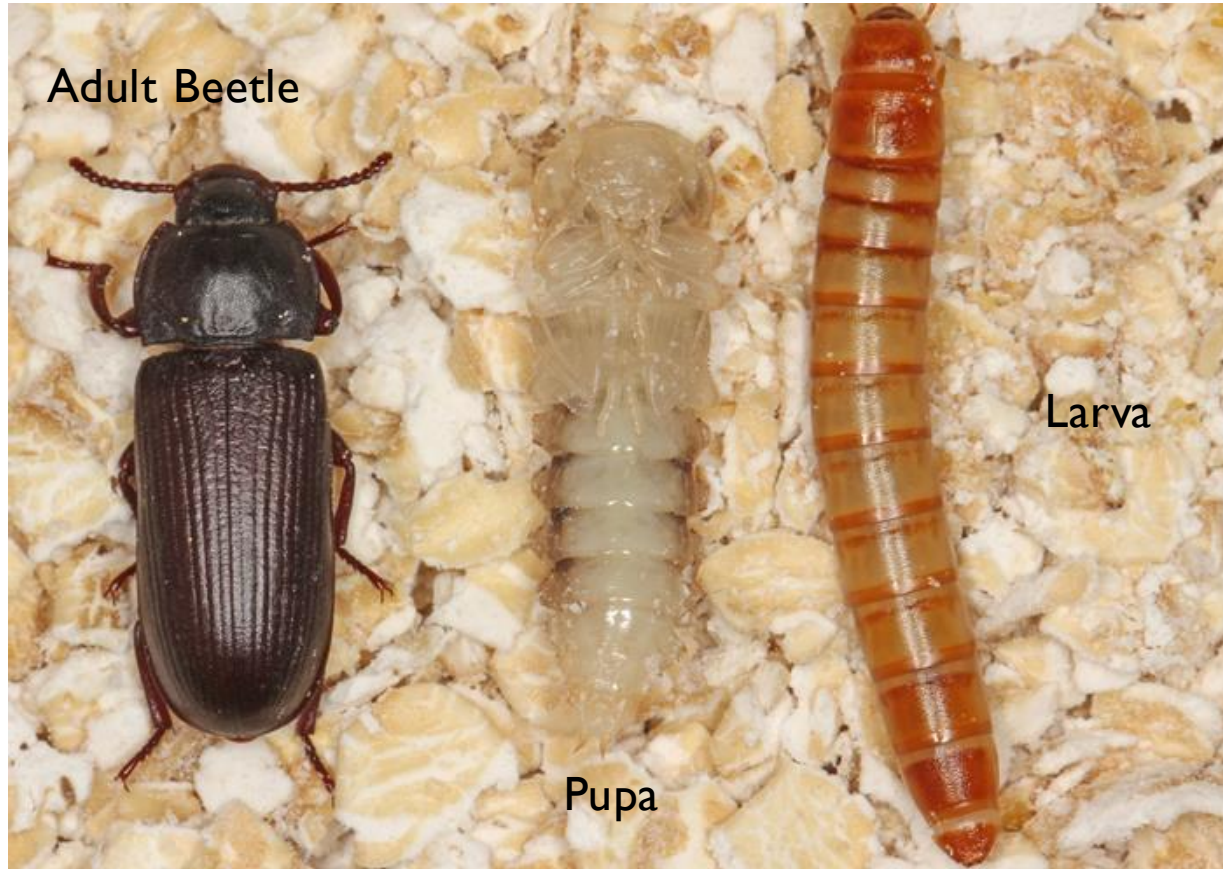
# Mealworm Life Cycle

- Life Stages:
  - Egg (4-7 days)
  - Larva (10 weeks)
  - Pupa (6-18 days)
  - Adult Beetle (8-12 weeks)



## Darkling Beetle Life Cycle





Adult Beetle

Pupa

Larva

# Mealworm Care

## Temperature

- Mealworms prefer temperatures between 65°F to 80°F. But they can survive up to 100°F but will need an additional source of moisture.

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## Humidity

- Prefer 70% humidity.
- If the temperature is on higher side, you can lightly mist a paper towel and place it over the bedding.

## Lighting

- Mealworms prefer to be in the dark.

# Mealworm Care...

## Bedding/Food Source

- Need about  $\frac{3}{4}$ -1 inch of grain for their bedding/food source.



# Mealworm Care...

## Bedding/Food Source

- Need about  $\frac{3}{4}$ -1 inch of grain for their bedding/food source.
- They will eat almost any type of grain such as:
  - oatmeal
  - wheat bran
  - cornmeal



# Mealworm Care...

## Water Source

- Fruits and vegetables can be used as a water source. Remove immediately if there is any mold present.



# Mealworm Care...

## Water Source

- Fruits and vegetables can be used as a water source. Remove immediately if there is any mold present.
- Common water sources are:
  - carrots
  - potatoes
  - apples



# Edible Insect Project

Your class will study how to best raise mealworms



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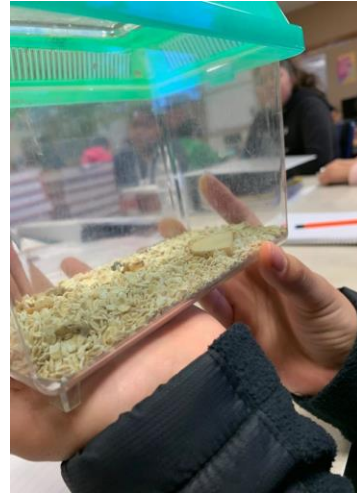
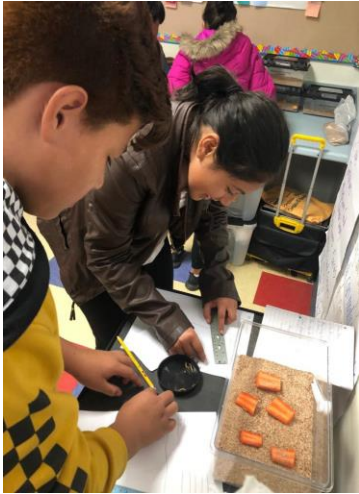
- You can ask questions about how temperature, humidity, light, food, or water sources affect mealworm growth.



# Edible Insect Project

Your class will study how to best raise mealworms

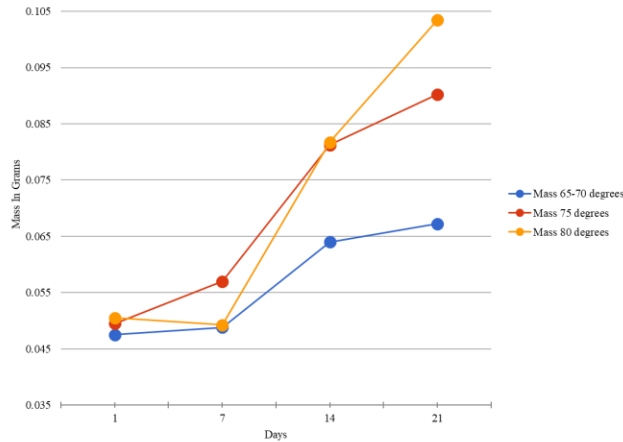
- Each week your class will measure/weigh the mealworms to collect data.



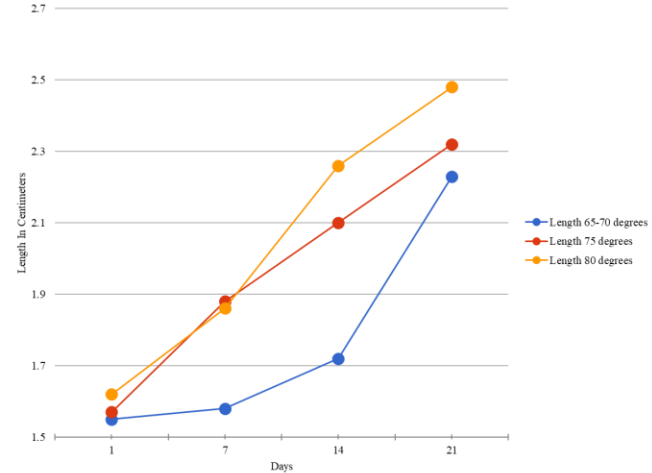
# Edible Insect Project

Your class will study how to best raise mealworms

- At the end of your experiment, you can graph your data.



Change in mass over time  
between different temperatures



Change in length over time between  
different temperatures.

# Edible Insect Project

Your class will study how to best raise mealworms

- Your class will be given
  - 500 mealworms
  - three terrariums
  - wheat bran & carrots
  - rulers & scale



# Edible Insect Project

Your class will study how to best raise mealworms

- Your mealworms were fed wheat bran, carrots for their water source, and kept in the dark. This should be your control.



# Edible Insect Project

Good luck and happy mealworm farming!



# Eating insects could help save the planet



# Eating insects could help save the planet

## Entomophagy

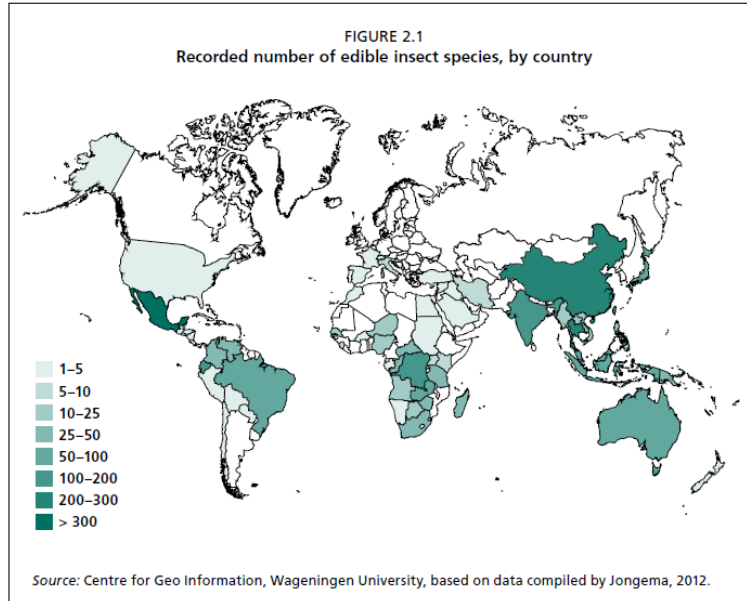
- The act of eating insects. Over 1,900 insect species are edible.



# Eating insects could help save the planet

## Entomophagy

- 2.5 billion people across Asia, Africa and Latin America regularly eat insects.



# Eating insects could help save the planet

## Entomophagy

- They are a healthy snack commonly found in markets and sold by street vendors.



Caterpillars for sale in Kinshasa, Democratic Republic of the Congo



Insect snacks and candies for sale, Canada



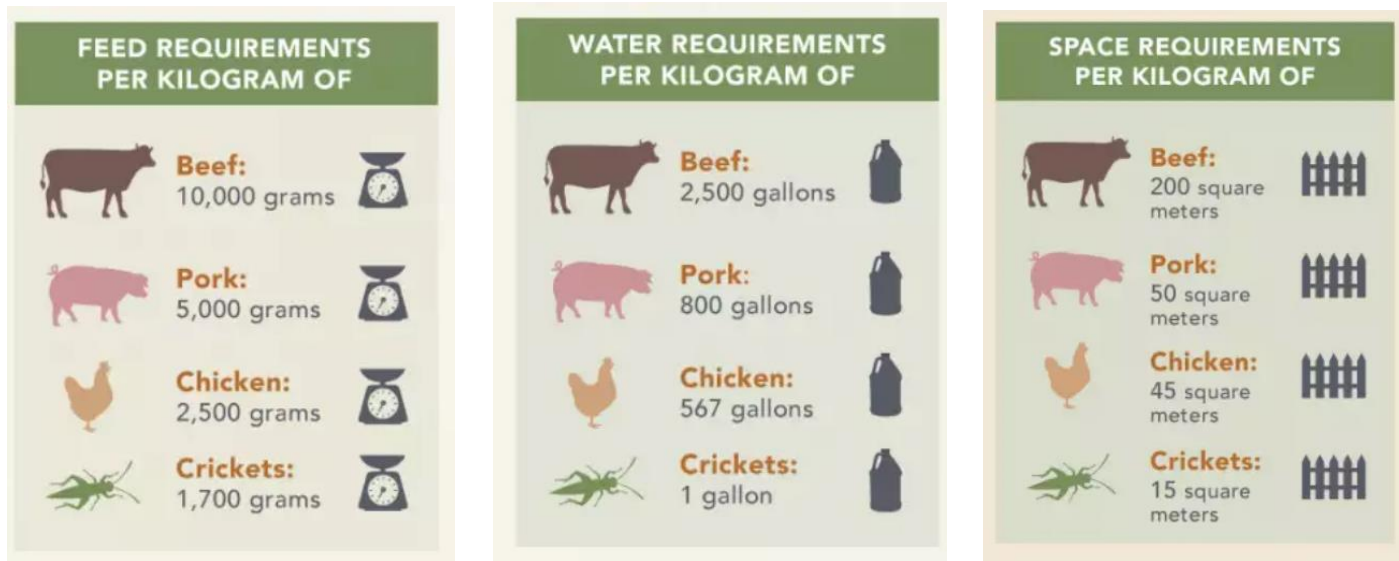
Scorpions for sale, China



A variety of insects for sale as street food in Bangkok, Thailand

# Eating insects could help save the planet

- Insects require less feed, water and land to produce one kilogram of protein.



# Eating insects could help save the planet

- Insects produce less green house gasses than other animals.



# Eating insects could help save the planet

- Insects are just as nutritious as other protein sources.

	 SALMON, FARMED	 WHOLE EGGS	 CRICKETS	 MEALWORMS	 BEEF (90% LEAN)	 TOFU
<b>PROTEIN</b>	20.4g	19.2g	<b>31g</b>	<b>16.2g</b>	22.4g	24.6g
<b>FAT</b>	13.4g	15.2g	<b>8.1g</b>	<b>14.8g</b>	11.2g	12.6g
<b>SATURATED FAT</b>	3g	4.8g	<b>2.6g</b>	<b>4.9g</b>	4.4g	2.7g
<b>OMEGA-3 FATTY ACIDS</b>	2.5g	0.1g	<b>1.8g</b>	<b>3.3g</b>	0.04g	0.5g
<b>FIBER</b>	0g	0g	<b>7.2g</b>	<b>2.5g</b>	0g	2.7g

# New Sustainable Agriculture Degree at CSUCI

- If you enjoy farming mealworms, CSU Channel Islands' Sustainable Agriculture program might be for you!
- Learn about plant science, aquaculture, entomology and beekeeping!
- Also learn about Smart Agriculture, Food Justice and Principles in Agribusiness!

