

Warm, Cold and Room Temperature Soil and its Affect on Earthworms Burrowing Time

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Introduction

Earthworms are affected by many different stimuli, one of which is temperature of their environment. In our experiment, we tested how the temperature of the soil affects the burrowing rate of worms (from being placed on top of the soil, to be completely submerged in soil). In past research it was concluded that the burrowing activity of the earthworm was affected significantly by soil temperature. (Perreault and Whalen, 2006). Worms are useful as a model because they are simple organisms and have basic attributes. They can also be compared to humans because of their similar nervous system and their muscles. We wanted to answer the question of what climate earthworms thrive in. To answer this question, we placed one 1 liter beaker in the freezer to cool the soil, left another 1 liter beaker at room temperature, and the last was placed in water at 40 degrees Celsius to heat the soil. My hypothesis was that if the soil was at room temperature, then the earthworm would burrow fastest because there would be no unnatural temperatures for the worms to adapt to such as warm and cold climates.

Materials

- 3- 1 liter plastic beakers
- Damp Stein's premium topsoil
- Dechlorinated water
- 15 similar earthworms
- Poly Probath hot water bath
- 2 9oz clear plastic cups
- 6 frozen gel ice packs
- Duct tape and masking tape
- Crosley (brand) freezer
- Brown paper towels
- 3 stopwatches

Procedure

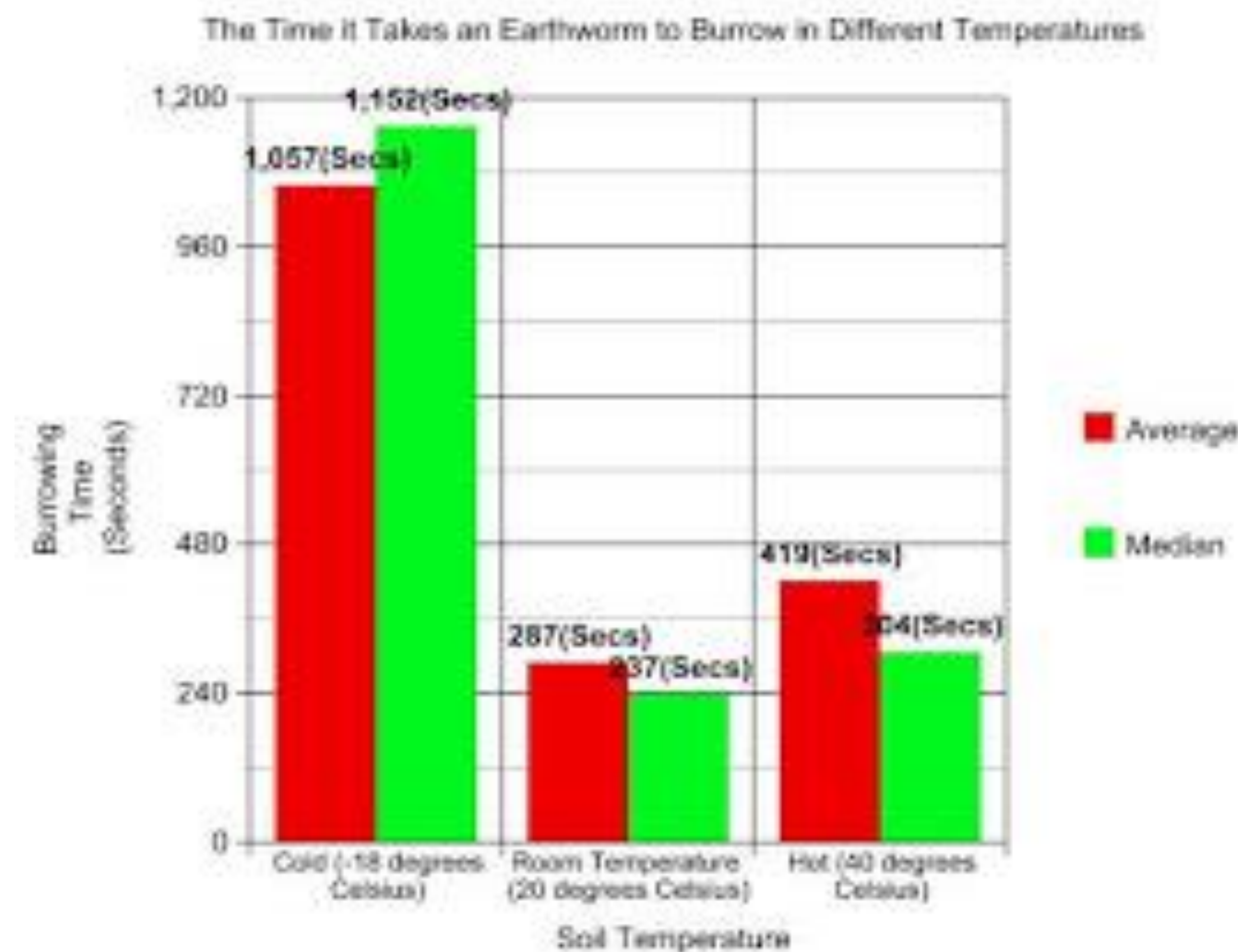
- We obtained three different soil temperatures.
- One warm temperature soil (placed in 40 degrees Celsius hot water boiler).
- One cold temperature soil (placed in Crosly Fridge for 20 minutes, then ice packs were taped to maintain temperature).
- Room temperature was just plain soil.
- We started the timer right when the worm touched the soil, and stopped it right when the worm disappeared beneath the soil.
- We ran this test five times for each temperature.

Abstract

In this lab we answered the question: what effect does temperature have on an earthworm's burrowing time? We answered this question by having three plastic beakers filled up to the one liter mark with damp premium topsoil. Then ice packs were taped onto one beaker, then was put in the freezer. Another plastic beaker was taped down into a hot water bath, and the hot water bath was set at 40°C. Once each beaker of soil reached the desired temperature, an earthworm was placed into each beaker and a stopwatch was started. While the earthworm was burrowing, qualitative data were collected about where the worm moved, and how it reacted to the temperature. As soon as the earthworm had completely burrowed, the stopwatch was stopped, and the time was recorded. This process was repeated five times for each temperature, a total of 15 trials. This experiment is important to humans because, first off, the faster a worm burrows and works, the more fertile the soil is. This knowledge can be applied to gardening and farming because plants will usually grow better in more fertile soil, so if they plant at a temperature in which worms work fast, the plants will grow better. This can also reflect how humans work in these specific temperatures, based on these data, I can hypothesis that humans would also work slower in colder temperatures than warmer temperatures, but prefer room temperature.

Temperature of Soil and Its Effect on Burrowing of Earthworms

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average	Median
Warm soil	18:15min 1095 sec.	2:38min 98sec	8:24min 504 sec	2:34min 94 sec	5:04min 304 sec	6:59min 419 sec	5:04min 304 sec
Room Temperature	1:31 min 91 sec	3:57 min 237 sec	4:53 min 293 sec	9:42 582 sec	3:52 min 232 sec	4:47 min 287 sec	3:57 min 237 sec
Cold Soil	19:12 min 1152 sec	14:58 min 898 secs	14:03 min 843 secs	<20 min <1200 sec	19:53 min 1193 sec	17:37 min 1057 sec	19:12 min 1152 secs



Additional Questions

So we found an earthworm's favorite temperature, what could we do with that information? The burrowing time of worms could affect the fertility of the soil, meaning that plants will grow faster in moderate temperatures, because that is the temperature that worms fertilize soil fastest in. This knowledge could be used to determine what the best temperature for gardening or farming is if earthworms are present. Also, How do worms sense temperature, do their nerves sense it? Or is it some other system in their body?

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Conclusion

From this experiment we can conclude that an earthworm will burrow fastest when in room temperature soil, slower in warm soil, and the slowest in cold soil. My hypothesis was that the earthworms would burrow quickest in room temperature soil, data to support this includes the median of each temperature range and their trials. After gathering these data I can support my hypothesis that earthworms will burrow fastest in room temperature soil.