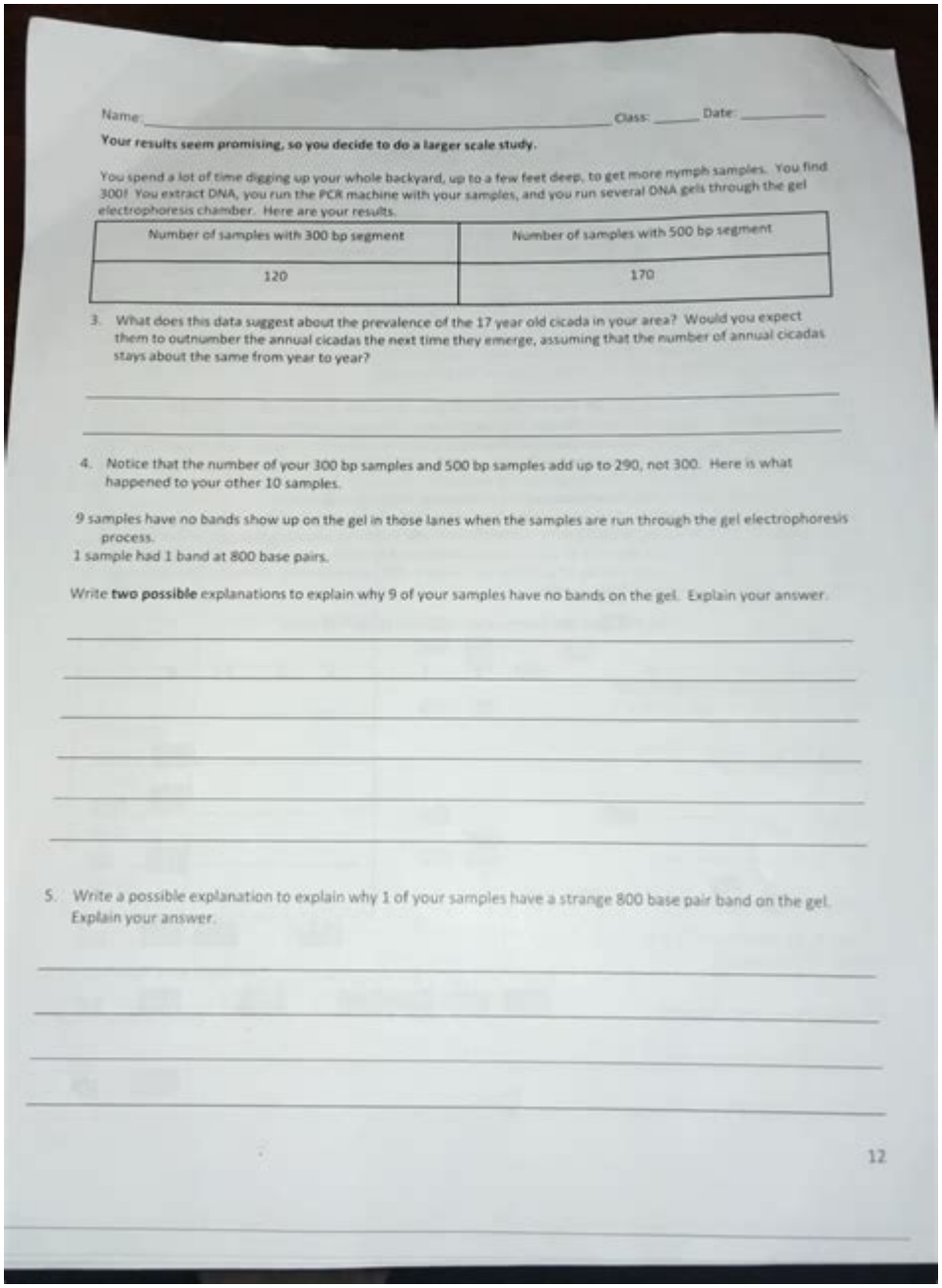
The Cicada Conundrum Answer Key



Name: _____ Class: _____ Date: _____

Your results seem promising, so you decide to do a larger scale study.

You spend a lot of time digging up your whole backyard, up to a few feet deep, to get more nymph samples. You find 300! You extract DNA, you run the PCR machine with your samples, and you run several DNA gels through the gel electrophoresis chamber. Here are your results.

Number of samples with 300 bp segment	Number of samples with 500 bp segment
120	170

3. What does this data suggest about the prevalence of the 17 year old cicada in your area? Would you expect them to outnumber the annual cicadas the next time they emerge, assuming that the number of annual cicadas stays about the same from year to year?

4. Notice that the number of your 300 bp samples and 500 bp samples add up to 290, not 300. Here is what happened to your other 10 samples.

9 samples have no bands show up on the gel in those lanes when the samples are run through the gel electrophoresis process.
1 sample had 1 band at 800 base pairs.

Write **two possible** explanations to explain why 9 of your samples have no bands on the gel. Explain your answer.

5. Write a possible explanation to explain why 1 of your samples have a strange 800 base pair band on the gel. Explain your answer.

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The cicada conundrum answer key is a fascinating topic that delves into the unique life cycle and behaviors of cicadas, particularly the periodical cicadas that emerge in cycles of 13 or 17 years. This article aims to explore the intricacies of these insects, their life stages, the reasons behind their long developmental periods, and ultimately, the answers to the conundrums surrounding their existence.

Understanding Cicadas: An Overview

Cicadas are often recognized by their distinctive songs and large, winged bodies. Belonging to the order

Hemiptera, cicadas are divided into two main categories: annual cicadas and periodical cicadas. While annual cicadas can be seen every summer, periodical cicadas emerge in synchronized swarms after a long dormancy.

The Life Cycle of Cicadas

The life cycle of cicadas is complex and can be broken down into several stages:

1. **Egg Stage:** Female cicadas lay their eggs in small slits they cut into tree branches. After about six to ten weeks, the eggs hatch into nymphs.

2. **Nymph Stage:** Nymphs fall to the ground and burrow into the soil, where they will spend the majority of their life. This stage can last anywhere from 13 to 17 years for periodical cicadas.

3. **Adult Stage:** After their lengthy development underground, nymphs emerge, molt, and transform into adults, which then seek mates and reproduce.

The Cicada Conundrum

The term "cicada conundrum" refers to the perplexing questions surrounding the life cycle of periodical cicadas, particularly their long developmental period and the synchronized emergence of millions of individuals. This phenomenon raises several intriguing questions:

Why Do Cicadas Have Such Long Life Cycles?

The long life cycle of cicadas is one of nature's mysteries. Several theories attempt to explain this phenomenon:

- **Predator Avoidance:** By emerging in large numbers after many years, cicadas overwhelm their predators. This strategy, known as "predator satiation," ensures that a sufficient number of cicadas survive to reproduce.

- **Environmental Synchronization:** The lengthy developmental period may allow cicadas to synchronize their emergence with specific environmental conditions, such as optimal temperatures

and food availability.

- **Genetic Adaptation:** It is theorized that these long cycles may be genetically programmed, allowing cicadas to avoid periods of unfavorable conditions, such as droughts or food shortages.

Why Do They Emerge Synchronously?

The synchronized emergence of periodical cicadas is another fascinating aspect of their biology. Several factors contribute to this behavior:

- **Biological Clocks:** Cicadas possess an internal biological clock that regulates their growth and development. This clock ensures that they emerge simultaneously after years of dormancy.
- **Environmental Cues:** Temperature and soil moisture levels serve as cues for cicadas. Once certain conditions are met, it triggers mass emergence.
- **Social Interactions:** The emergence of cicadas may also be influenced by the presence of other cicadas, as the sound of their calls can stimulate others to emerge.

The Impact of Cicadas on the Ecosystem

Cicadas play a crucial role in their ecosystems. Their emergence and life cycle contribute in several ways:

Nutrient Cycling

When cicadas die, their bodies decompose, returning nutrients to the soil. This process enriches the soil, promoting plant growth. The massive die-off of cicadas after their brief adult life cycle provides a substantial nutrient boost for the ecosystem.

Food Source

Cicadas serve as an essential food source for various animals, including birds, mammals, reptiles, and even

other insects. Their emergence provides a feast for many predators, thus supporting the food web.

Pollination

While cicadas are not primary pollinators, their activity can inadvertently assist in the pollination process as they move from plant to plant, feeding on tree sap.

Human Interaction with Cicadas

Cicadas have intrigued humans for centuries, leading to various cultural, culinary, and scientific interactions.

Cultural Significance

In many cultures, cicadas symbolize rebirth and immortality due to their unique life cycle. They are often featured in literature, art, and folklore.

Culinary Uses

Interestingly, cicadas are also edible. In some regions, they are harvested and consumed, particularly during their emergence years. They are often prepared in various ways, including frying or baking.

Scientific Research

Cicadas are a subject of extensive scientific research due to their unique life cycles and behaviors. Studies focus on their genetics, evolution, and ecological impact, providing insights into broader ecological principles and evolutionary biology.

Answer Key to the Cicada Conundrum

As we explore the cicada conundrum, it becomes clear that there is no single answer. Rather, it is a combination of evolutionary strategies, ecological interactions, and environmental factors that contribute to the cicada's unique life cycle. Here are some key points that summarize the answers to the cicada

conundrum:

1. **Long Life Cycle:** Predation satiation, genetic programming, and environmental synchronization are key factors.

2. **Synchronous Emergence:** Biological clocks, environmental cues, and social interactions play crucial roles.

3. **Ecosystem Impact:** Nutrient cycling, serving as a food source, and assisting in pollination highlight their ecological importance.

4. **Human Interaction:** Cicadas have cultural significance, are edible, and are subjects of scientific research.

Conclusion

The cicada conundrum is a captivating blend of biology, ecology, and cultural significance. Understanding the life cycle and behaviors of cicadas not only answers some of the questions surrounding their existence but also highlights their crucial role in the ecosystem. With their unique adaptations and strategies, cicadas remain one of nature's most intriguing insects, capturing the curiosity of scientists and nature enthusiasts alike. The cicada's story is a reminder of the complexity of life and the mysteries that still await discovery in the natural world.

Frequently Asked Questions

What is the cicada conundrum?

The cicada conundrum refers to the puzzling life cycle of cicadas, particularly the 17-year and 13-year varieties, which emerge in sync after long periods underground.

Why do cicadas have such long life cycles?

Cicadas have long life cycles as a survival strategy, allowing them to evade predators and environmental changes by emerging in large numbers at specific intervals.

What is the significance of the cicada's synchronized emergence?

The synchronized emergence of cicadas is significant because it overwhelms predators, ensuring that enough cicadas survive to reproduce.

How do scientists use the term 'cicada conundrum'?

Scientists use the term 'cicada conundrum' to describe the ongoing research and debate surrounding the evolutionary advantages and mechanisms behind the cicadas' unique life cycles.

What are some common misconceptions about cicadas?

A common misconception is that all cicadas emerge every year; in reality, only certain species emerge in cycles of 13 or 17 years, while others may have annual life cycles.

How can I identify different cicada species during their emergence?

You can identify different cicada species by their distinct sounds, physical characteristics, and the timing of their emergence, as some species emerge at specific times of the year.

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