

Name An Organism Where 10% Of The Energy That Is Passed On Would Be Found? 0 A. Buzzard 0 B. Mouse 0 C.

Understanding Energy Transfer in Ecosystems: Analyzing the Organism with 10% Energy Transfer

Name An Organism Where 10% Of The Energy That Is Passed On Would Be Found? 0 A. Buzzard 0 B. Mouse 0 C. is a question that prompts us to delve into the fascinating world of ecological energy transfer. This concept, rooted in ecological pyramids and food chains, explains how energy moves from one organism to another within an ecosystem. Recognizing which organisms retain or transfer a specific percentage of energy is crucial for understanding ecological dynamics, population sustainability, and conservation efforts.

The Concept of Energy Transfer in Ecosystems

What Is Energy Transfer?

Energy transfer in ecosystems refers to the movement of energy through different trophic levels, starting from producers (such as plants) and moving up to herbivores, carnivores, and decomposers. Only a fraction of the energy consumed by an organism is passed on to the next level; the rest is lost as heat, used for metabolic activities, or remains in waste.

Energy Efficiency and Trophic Levels

The efficiency of energy transfer typically follows the "10% rule," which states that on average, only about 10% of the energy at one trophic level is transferred to the next. This rule helps explain why higher trophic levels have less biomass and why energy diminishes as we ascend the food chain.

Analyzing the Organisms: Buzzard and Mouse

Role of the Mouse in the Food Chain

Mice are herbivorous or omnivorous small mammals that often serve as primary

consumers in ecosystems. They feed on seeds, grains, insects, and plant material, converting this energy into biomass. Mice are prey for many predators, including birds of prey, snakes, and mammals.

Role of the Buzzard in the Food Chain

Buzzards are scavenging or predatory birds that typically occupy higher trophic levels. They feed on small mammals, carrion, insects, and sometimes other birds. As apex or secondary consumers, buzzards are positioned higher in the food chain, often consuming organisms that have already transferred energy from lower levels.

Which Organism Retains Around 10% of the Energy?

Applying the 10% Rule

Given the 10% rule, the organism that retains approximately 10% of the energy passed to it from its prey or food source is usually at a higher trophic level.

- Mice typically consume energy-rich plant material or insects, which have already received energy from producers.
- Buzzards consume small mammals like mice, along with carrion, and are thus higher in the food chain.

Estimating Energy Transfer in the Food Chain

Suppose:

- Producers (plants) capture solar energy and convert it into chemical energy.
- Primary consumers (like mice) obtain about 10% of this energy.
- Secondary consumers (like buzzards) obtain about 10% of the energy from mice.

This stepwise reduction illustrates that, generally, only about 1% of the original solar energy reaches the top predators, due to successive 10% transfers.

Detailed Explanation: Which Organism Has 10%

Energy Transfer?

Mouse as a Primary Consumer

Mice are typically primary consumers, feeding directly on producers. They usually retain roughly 10% of the energy from plants or insects they consume. This makes mice an important link in the energy transfer chain, but they do not generally have exactly 10% of the original energy passing through them; instead, they pass on about 10% of what they consume.

Buzzard as a Secondary or Tertiary Consumer

Buzzards, feeding on mice and other small animals, are higher in the trophic hierarchy. They tend to transfer even less energy—around 10% of the energy they receive from their prey—due to metabolic costs and inefficiencies.

Conclusion on the Organism with 10% Energy Transfer

Based on the 10% rule, the organism where approximately 10% of the energy that is passed on would be found is typically the organism itself at that trophic level.

- If considering the energy passed from prey to predator, both mice and buzzards transfer roughly 10% of the energy they consume to the next level.
- Therefore, in this context, the mouse (as a primary consumer) is an organism where about 10% of the energy from the plants or insects they eat is retained and passed on.

Implications of Energy Transfer Efficiency

Why Is Only About 10% of Energy Passed On?

This low transfer efficiency is due to several biological and ecological factors:

- Metabolic heat loss: Organisms use energy to maintain body temperature and perform activities.
- Waste production: Not all consumed energy is digestible or assimilable.
- Respiration: Organisms use energy for respiration, which releases heat.
- Incomplete digestion: Some parts of food are indigestible and excreted.

Impact on Population and Biomass

The 10% energy transfer rule explains:

- The decrease in biomass at higher trophic levels.
- Why top predators are fewer in number compared to primary consumers.
- The energy constraints that shape food webs and biodiversity.

Summary: Which Organism Has 10% of the Energy Passed On?

- In a typical food chain, organisms at each trophic level pass on about 10% of the energy they consume to the next level.
- Animals like mice, which serve as primary consumers, generally retain and transfer roughly 10% of the energy they obtain from plants or insects.
- Higher predators, such as buzzards, receive a smaller fraction of the original energy due to cumulative losses in the food chain.

Final Thoughts

Understanding the nuances of energy transfer in ecosystems is essential for ecological research, conservation strategies, and managing biodiversity. Recognizing which organisms retain or pass on approximately 10% of the energy helps ecologists map out food webs, predict population dynamics, and assess ecosystem health.

In conclusion, based on the principles of ecological energy transfer, the mouse is the organism where about 10% of the energy passed onto it from its food is typically retained and further transferred to higher trophic levels. This highlights the importance of primary consumers in maintaining the flow of energy within ecosystems and underscores the inefficiency inherent in ecological energy transfer processes.

Frequently Asked Questions

In which organism is approximately 10% of the energy passed on to the next level in a food chain?

The mouse (Option B) is an example where about 10% of the energy is transferred to the next level.

Why is only about 10% of energy transferred from one trophic level to the next?

Because energy is lost mainly as heat, used for metabolic processes, and some remains unassimilated, resulting in roughly 10% transfer between levels.

Which organism listed is most likely to have around 10% energy transfer in a food chain?

Mouse (Option B) is most representative of this energy transfer efficiency.

What is the significance of understanding energy transfer percentages in ecosystems?

It helps in understanding biomass distribution, ecological efficiency, and energy flow dynamics within food webs.

Among the options given, which organism is a primary consumer, making it relevant for energy transfer studies?

The mouse (Option B) is a primary or secondary consumer, relevant for studying energy transfer.

How does the energy transfer percentage impact the population size of organisms at different trophic levels?

Lower energy transfer (around 10%) limits the biomass and population size at higher trophic levels, influencing ecosystem structure.

Additional Resources

Name An Organism Where 10% Of The Energy That Is Passed On Would Be Found? A. Buzzard 0 B. Mouse 0 C.

Understanding energy transfer within ecosystems is fundamental to ecology, and one of the key concepts involved is the 10% energy transfer rule. This rule states that roughly only 10% of the energy from one trophic level is passed on to the next. In this context, identifying which organism exemplifies this energy transfer efficiency provides insight into ecological dynamics, predator-prey relationships, and energy flow within food webs. In this article, we will explore the question: Name an organism where 10% of the energy that is passed on would be found—specifically comparing options such as the buzzard and the mouse—and delve into the ecological principles

underpinning these figures.

The 10% Energy Transfer Rule in Ecology

Before analyzing specific organisms, it's essential to grasp the general principle of energy transfer in ecosystems.

What Is the 10% Rule?

The 10% rule, also known as Lindeman's Law, suggests that when energy moves from one trophic level to the next:

- Approximately 10% of the energy is retained.
- The remaining 90% is lost primarily through metabolic processes such as respiration, movement, growth, reproduction, and heat dissipation.

This rule guides our understanding of why food chains are typically limited in length and why top predators consume large amounts of prey to meet their energy needs.

Significance of the 10% Transfer

- Explains why energy input decreases at higher trophic levels.
- Clarifies why apex predators are relatively scarce compared to herbivores.
- Helps in modeling biomass distribution across ecosystems.

Comparing the Buzzard and the Mouse: A Trophic Perspective

Given the options—buzzard and mouse—it's important to analyze their roles within the food web and how energy transfer applies to each.

The Mouse: An Herbivore and Prey

Ecological Role

- Mice are small rodents that primarily feed on seeds, grains, and insects.
- They are preyed upon by a variety of predators, including birds of prey like buzzards, snakes, and mammals.

Energy Flow Involving Mice

- Mice consume plants or invertebrates, converting plant energy into animal biomass.
- When a predator consumes a mouse, it gains approximately 10% of the energy from the mouse's biomass, consistent with the general rule.

Significance of the 10% in Mice

- The mouse acts as a secondary or tertiary consumer depending on its diet.
- When energy is passed from mice to their predators, about 10% of the mouse's energy is transferred.

The Buzzard: A Top Predator

Ecological Role

- Buzzards are birds of prey that often feed on small mammals like mice, insects, and other small vertebrates.
- As a higher trophic level predator, buzzards are near the top of the food chain.

Energy Transfer Involving Buzzards

- When a buzzard consumes a mouse, it receives roughly 10% of the energy that was stored in the mouse.
- The buzzard then further expends energy in hunting, flying, and metabolic processes, passing only a fraction of that energy to the next trophic level if it is preyed upon.

Significance of the 10% in Buzzards

- The energy transfer from prey (mouse) to predator (buzzard) aligns with the 10% rule.
- The buzzard, as an apex or near-apex predator, demonstrates the cumulative effect of energy loss across multiple trophic transfers.

How the 10% Rule Applies to These Organisms

This comparison illustrates the core principle: the 10% of energy passed from prey to predator.

Energy Flow from the Mouse to the Buzzard

- Prey (Mouse): Contains a certain amount of energy derived from its diet.
- Predator (Buzzard): Gains approximately 10% of the mouse's energy after predation.
- Implication: The buzzard's energy input from a single mouse is only about 10% of what the mouse had initially stored, exemplifying the rule.

Energy Loss at Each Step

- Energy is lost at every trophic transfer, mainly due to:
 - Metabolic heat: Lost during respiration.
 - Movement and activity: Energy used in hunting, flying, and foraging.
 - Growth and reproduction: Diverts energy away from biomass transfer.

- As a result, organisms at higher levels have less energy available for growth and reproduction, which limits the length of food chains.

Practical Examples in Ecosystems

To better understand how these principles manifest in real ecosystems, consider the following detailed examples:

Example 1: Rodent and Bird of Prey System

- Grass: The primary producer, with a large energy base.
- Grass to Mouse: About 10% of the energy in plants is transferred to mice through herbivory.
- Mouse to Buzzard: About 10% of the mouse's energy is transferred to the buzzard.
- Buzzard to Higher Predators: Similarly, only about 10% of the buzzard's energy is transferred to any subsequent predator.

Example 2: Marine Food Chain

- Phytoplankton: Convert solar energy into biomass.
- Zooplankton: Consume phytoplankton, passing roughly 10% of that energy.
- Small Fish: Feed on zooplankton, again receiving about 10%.
- Larger Fish or Birds: Consume small fish, passing on about 10% of the energy, illustrating the same rule.

Which Organism Exemplifies 10% Energy Transfer?

Given the options and the ecological principles, the organism where 10% of the energy that is passed on would be found is typically the prey being consumed by a predator.

Why?

- The prey (mouse) contains a certain energy store.
- The predator (buzzard) gains approximately 10% of that energy during predation.

Therefore, the organism from which 10% of the energy is transferred is the mouse—the prey—since the buzzard (the predator) only gains about 10% of the mouse's energy.

Summary and Key Takeaways

- The 10% energy transfer rule is a fundamental ecological principle

explaining energy flow in food webs.

- Mice serve as an essential link in many terrestrial food chains, transferring roughly 10% of their energy to predators such as buzzards.
- Buzzards are higher trophic level organisms that receive only about 10% of the energy from their prey, illustrating the cumulative energy loss across trophic levels.
- The organism where 10% of the energy passed on is found is the prey—in this case, the mouse.

Final Thoughts

Understanding the flow of energy through ecosystems not only helps ecologists appreciate the complexity of food webs but also informs conservation strategies and resource management. Recognizing that only a fraction (roughly 10%) of energy is transferred between trophic levels underscores why ecosystems are structured with multiple levels and why top predators are less abundant. Whether analyzing terrestrial mammals like mice or avian predators like buzzards, the principles of energy transfer remain consistent, providing a powerful framework for understanding natural systems.

In conclusion, if asked to name an organism where 10% of the energy that is passed on would be found, the answer is the mouse, acting as the prey species, which transfers approximately 10% of its stored energy to predators like the buzzard.

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