COMPILED AND CIRCULATED BY DR. POULAMI ADHIKARY MUKHERJEE, ASSISTANT PROFESSOR, DEPARTMENT OF ZOOLOGY, NARAJOLE RAJ COLLEGE

FOOD WEBS

BY

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Food Web:

A food web (or food cycle) is the natural interconnection of food chains and a graphical representation of what-eats-what in an ecological community. Another name for food web is consumer-resource system. A food web can be termed as the combination of many different food chains and the relationship that exists between each organism. A food web is a detailed interconnecting diagram that shows the overall food relationships between organisms in a particular environment. It can be described as a "who eats whom"

diagram that shows the complex feeding relationships for a particular ecosystem.

The concept of a food web, previously known as a food cycle, is typically credited to **Charles Elton**, who first introduced it in his book Animal Ecology, published in 1927. He is considered one of the founders of modern ecology and his book is a seminal work.

In a food web, organisms are arranged according to their trophic level. The trophic level for an organism refers to how it fits within

the overall food web and is based on how an organism feeds. Broadly speaking, there are two main designations: **autotrophs and heterotrophs**. **Autotrophs** make their own food while heterotrophs do not. Within this broad designation, there are five main trophic levels: primary producers, primary consumers, secondary consumers, tertiary consumers, and apex predators. A food web shows us how these different trophic levels within various food chains interconnect with one another as well as the flow of energy through the trophic levels within an ecosystem.

Trophic Levels in a Food Web:

Primary producers make their own food via photosynthesis. Photosynthesis uses the sun's energy to make food by converting its light energy into chemical energy. Primary producer examples are plants and algae. These organisms are also known as autotrophs.

Primary consumers are those animals that eat the primary producers. They are called primary as they are the first organisms to eat the primary producers who make their own food. These

animals are also known as herbivores. Examples of animals in this designation are rabbits, beavers, elephants, and moose.

Secondary consumers consist of organisms that eat primary consumers. Since they eat the animals that eat the plants, these animals are carnivorous or omnivorous. Carnivores eat animals while omnivores consume both other animals as well as plants. Bears are an example of a secondary consumer.

Similar to secondary consumers, tertiary consumers can be carnivorous or omnivorous. The difference being that secondary consumers eat other carnivores. An example is an eagle.

Lastly, the final level is composed of apex predators. Apex predators are at the top because they do not have natural predators. Lions are an example.

Additionally, organisms known as decomposers consume dead plants and animals and break them down. Fungi are examples of

decomposers. Other organisms known as detritivores consume dead organic material. An example of a detrivore is a vulture.

The Figure below shows a simplified food web in a desert ecosystem. In this food web, grasshoppers feed on plants; scorpions prey on grasshoppers; kit foxes prey on scorpions. While the food web showed here is a simple one, most feed webs are complex and involve many species with both strong and weak interactions among them. For example, the predators of a scorpion in a desert ecosystem might be a golden eagle, an owl, a roadrunner, or a fox.

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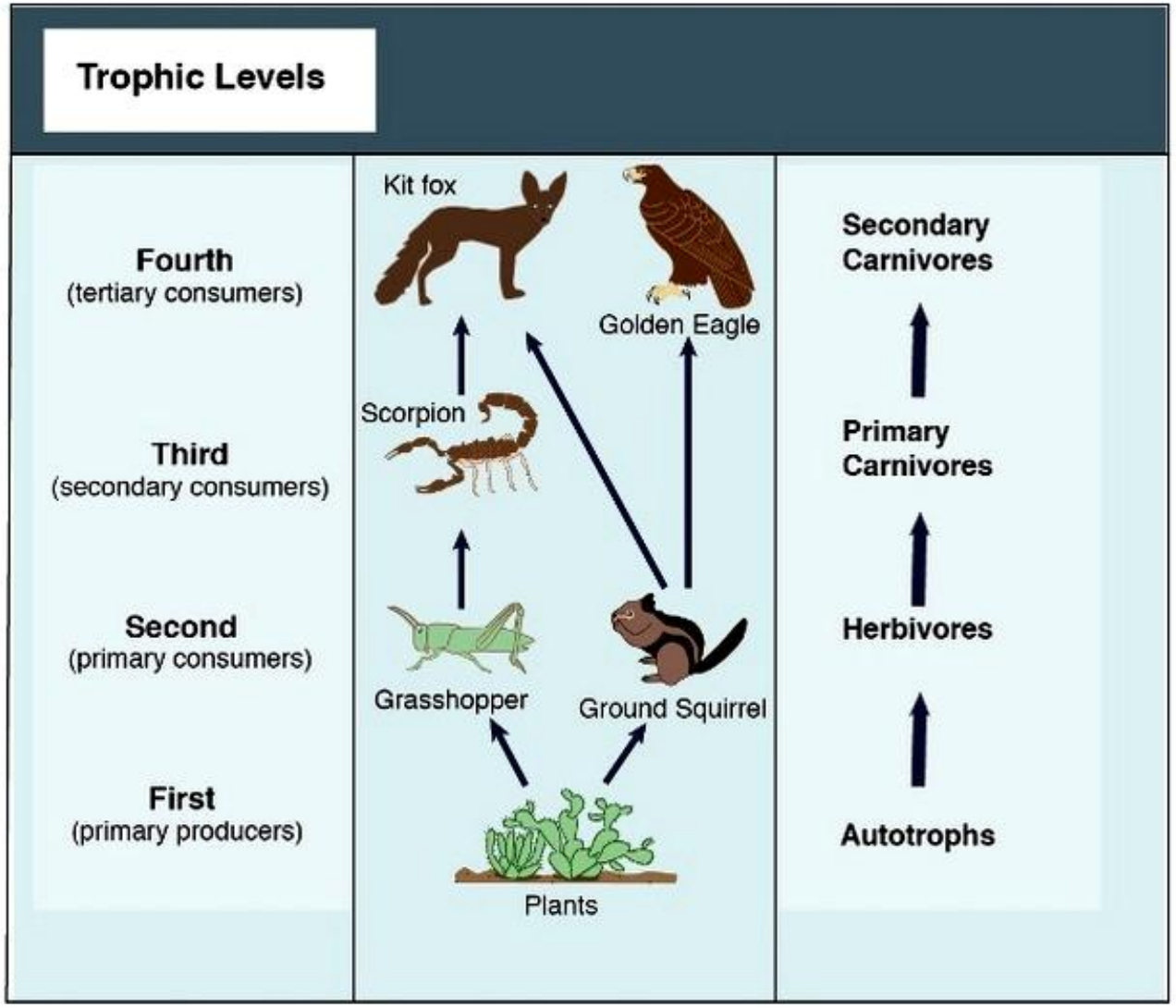

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Energy Movement:

Energy flows through the different trophic levels. It begins with the energy from the sun that autotrophs use to produce food. This energy is transferred up the levels as the different organisms are consumed by members of the levels that are above them. Approximately 10% of the energy that is transferred from one trophic level to the next is converted to biomass. Biomass refers to the overall mass of an organism or the mass of all the organisms that exist in a given trophic level. Since organisms expend energy to

move around and go about their daily activities, only a part of the energy consumed is stored as biomass.

Types of Food Webs:

There are a number of different types of food webs, which differ in how they are constructed and what they show or emphasize in relation to the organisms within the particular ecosystem. Scientists can use connectance and interaction food webs along with energy flow, fossil, and functional food webs to depict different aspects of the relationships within an ecosystem. Scientists can also further

classify the types of food webs based on what ecosystem is present in the food web.

Connectance Food Webs:

In a connectance food web, scientists use arrows to show one species being consumed by another species. All of the arrows are equally weighted. The degree of strength of the consumption of one species by another is not depicted.

Interaction Food Webs:

Similar to connectance food webs, scientists also use arrows in interaction food webs to show one species being consumed by another species. However, the arrows used are weighted to show the degree or strength of consumption of one species by another. The arrows depicted in such arrangements can be wider, bolder, or darker to denote the strength of consumption if one species typically consumes another. If the interaction between species is very weak, the arrow can be very narrow or not present.

Energy Flow Food Webs:

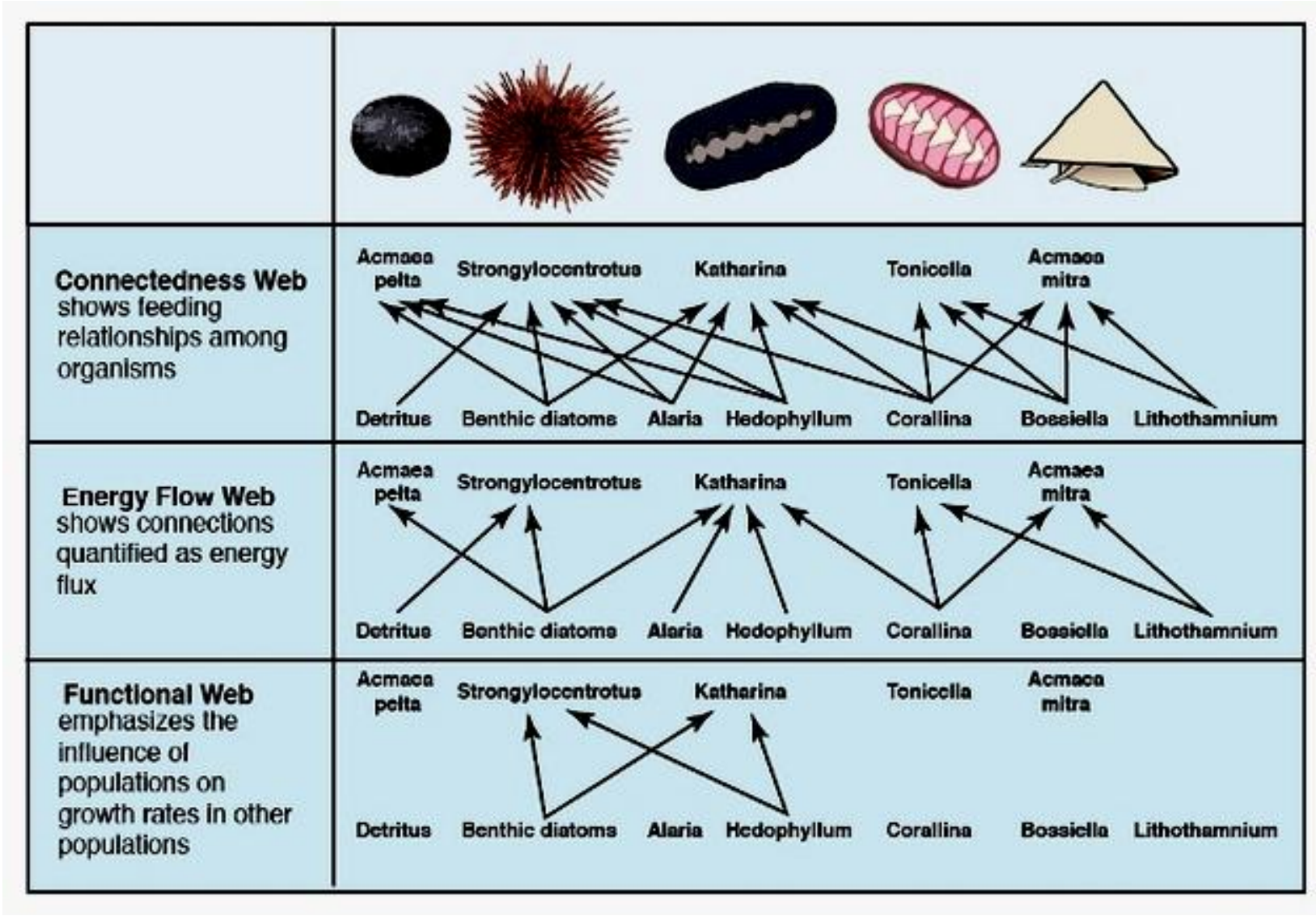
Energy flow food webs depict the relationships between organisms in an ecosystem by quantifying and showing the energy flux between organisms.

Fossil Food Webs:

Food webs can be dynamic and the food relationships within an ecosystem change over time. In a fossil food web, scientists attempt to reconstruct the relationships between species based on available evidence from the fossil record.

Functional Food Webs:

Functional food webs depict the relationships between organisms in an ecosystem by depicting how different populations influence the growth rate of other populations within the environment.


Connectedness Web
shows feeding relationships among organisms
Acmaea pelta
Strongylocentrotus
Katharina
Tonicella
Acmaea mitra
Detritus
Benthic diatoms
Alaria
Hedophyllum
Corallina
Bossiella
Lithothamnium
Energy Flow Web
shows connections quantified as energy flux
Acmaea pelta
Strongylocentrotus
Katharina
Tonicella
Acmaea mitra
Detritus
Benthic diatoms
Alaria
Hedophyllum
Corallina
Bossiella
Lithothamnium
Functional Web
emphasizes the influence of populations on growth rates in other populations
Acmaea pelta
Strongylocentrotus
Katharina
Tonicella
Acmaea mitra
Detritus
Benthic diatoms
Alaria
Hedophyllum
Corallina
Bossiella
Lithothamnium

Importance of Food Webs:

- Food webs can show how energy flows through an ecosystem.
- Food web offers an important tool for investigating the ecological interactions that define energy flows and predator-prey relationship.
- They also help us understand how toxins and pollutants become concentrated within a particular ecosystem.
- Food webs can also help us study and explain how the diversity of species is related to how they fit within the overall food dynamic.

- They may also reveal critical information about the relationships between invasive species and those native to a particular ecosystem.
- Food webs are constructed to describe species interactions (direct relationships). The fundamental purpose of food webs is to describe feeding relationship among species in a community.
- Food webs can be used to illustrate indirect interactions among species, which occurs when two species do not interact with each other directly, but influenced by a third species. Species can influence one another in many different ways.

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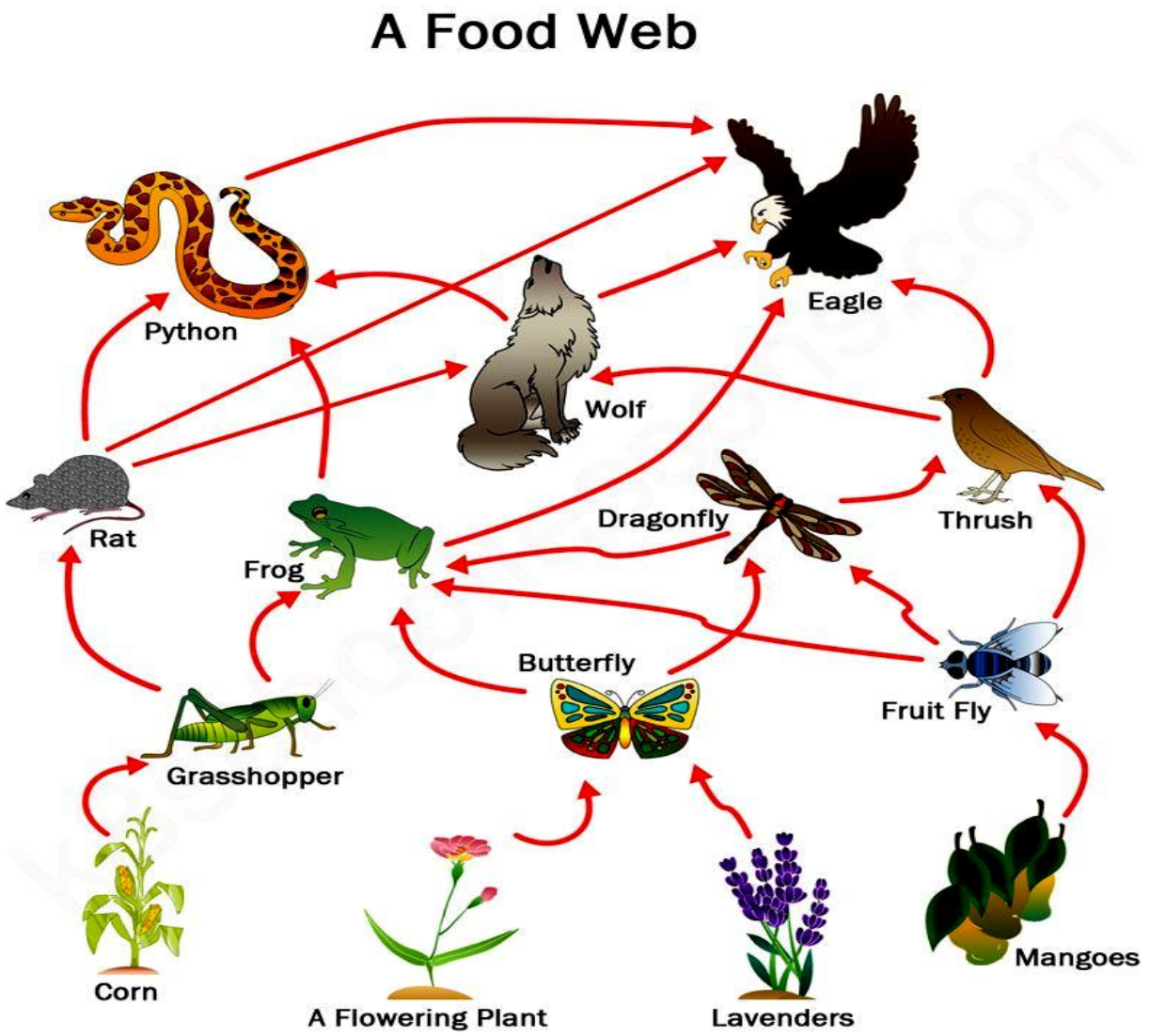

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Difference between Food Chain and Food Web

The most important differences Between Food Chain and Food Web are summarized below:

Difference Between Food Chain And Food Web	
Food Chain	**Food Web**
A linear pathway showing the flow of energy	A multitude of networks showing the flow of energy
An organism of higher level trophic feeds on a specific	An organism of higher trophic level has access to more

organism of lower trophic level	members of a lower trophic level.
Has no effect on the adaptability and competitiveness of organisms.	Has a role in improving the adaptability and competitiveness of an organism.

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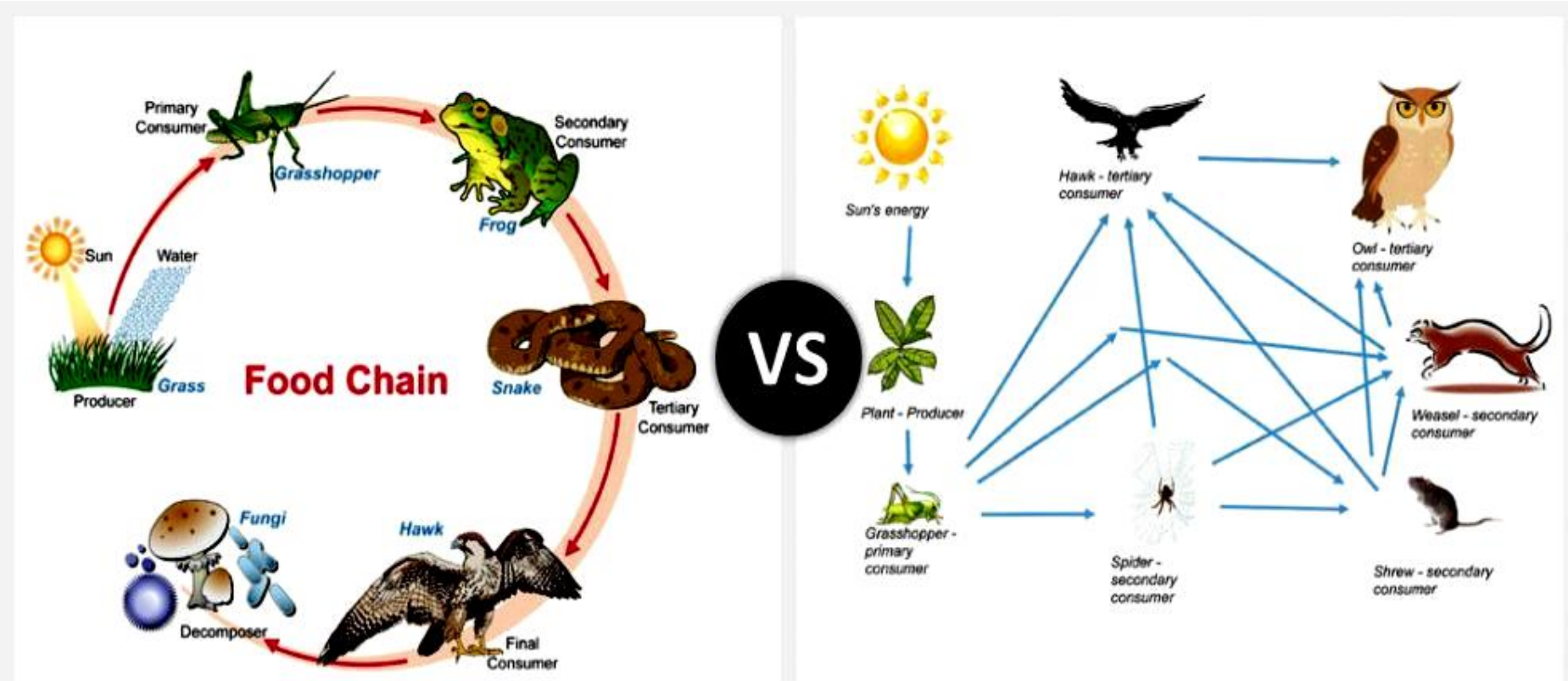

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THANK YOU