

RADIANT

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Physics

Heat and Energy

Lecture – 03

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Topics *to be covered*



1 SOURCES OF ENERGY

2 TYPES OF ENERGY

3 ENERGY CONVERSION

4 Questions



Recap *of previous lecture*



1 ENERGY FLOW IN AN ECOSYSTEM

2 FOOD CHAIN

3 ENERGY FLOW

4 Questions



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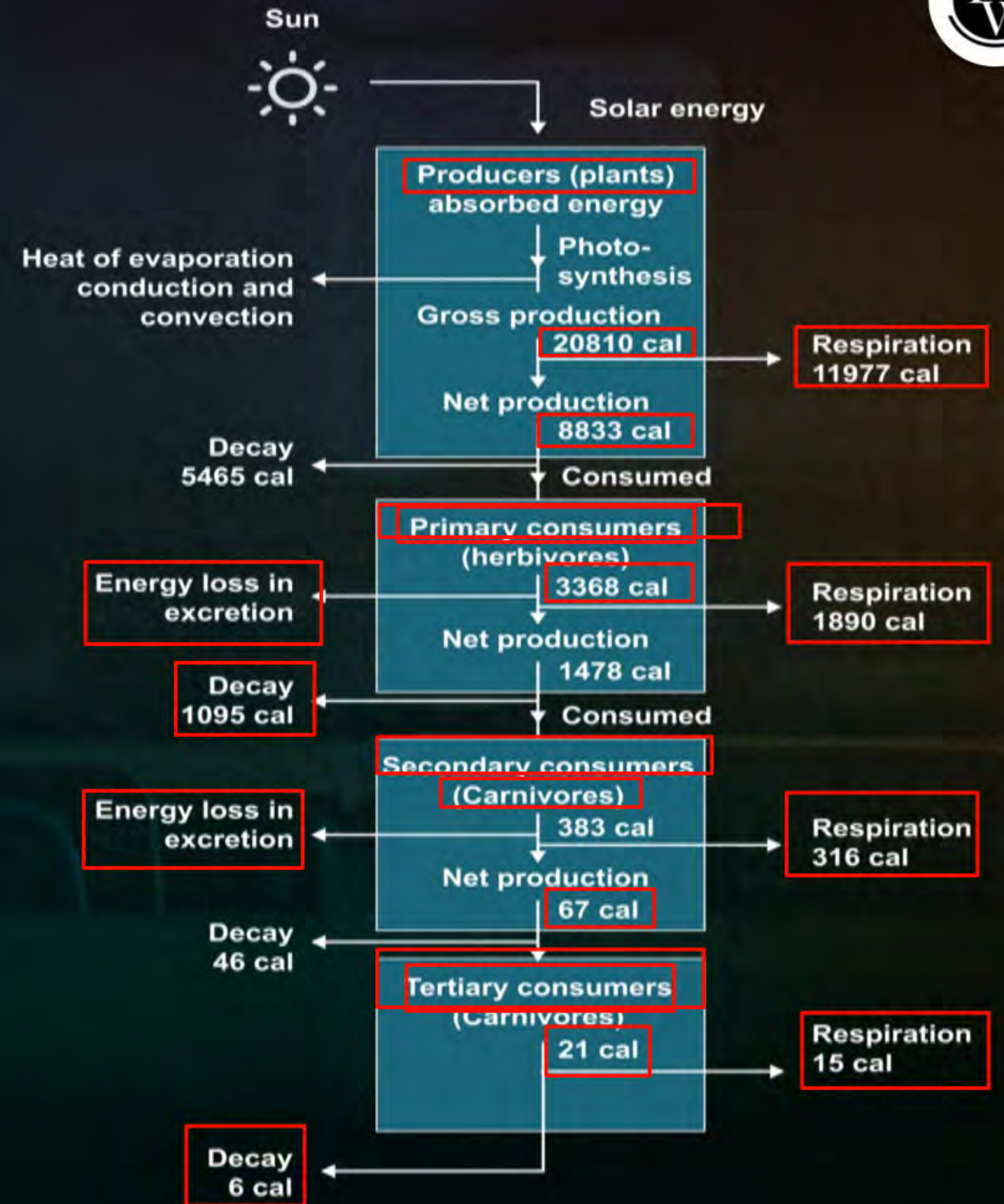
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ENERGY FLOW

By repeating the sequence, the tertiary consumers (carnivores) obtain energy as food from the secondary consumers and utilise a small part of it in respiration and remaining energy is wasted in their decay and decomposition. In Fig., the tertiary consumers obtain only 21 cal energy from the secondary consumers and rest of the energy (i.e., 46 cal) is wasted in their decay.

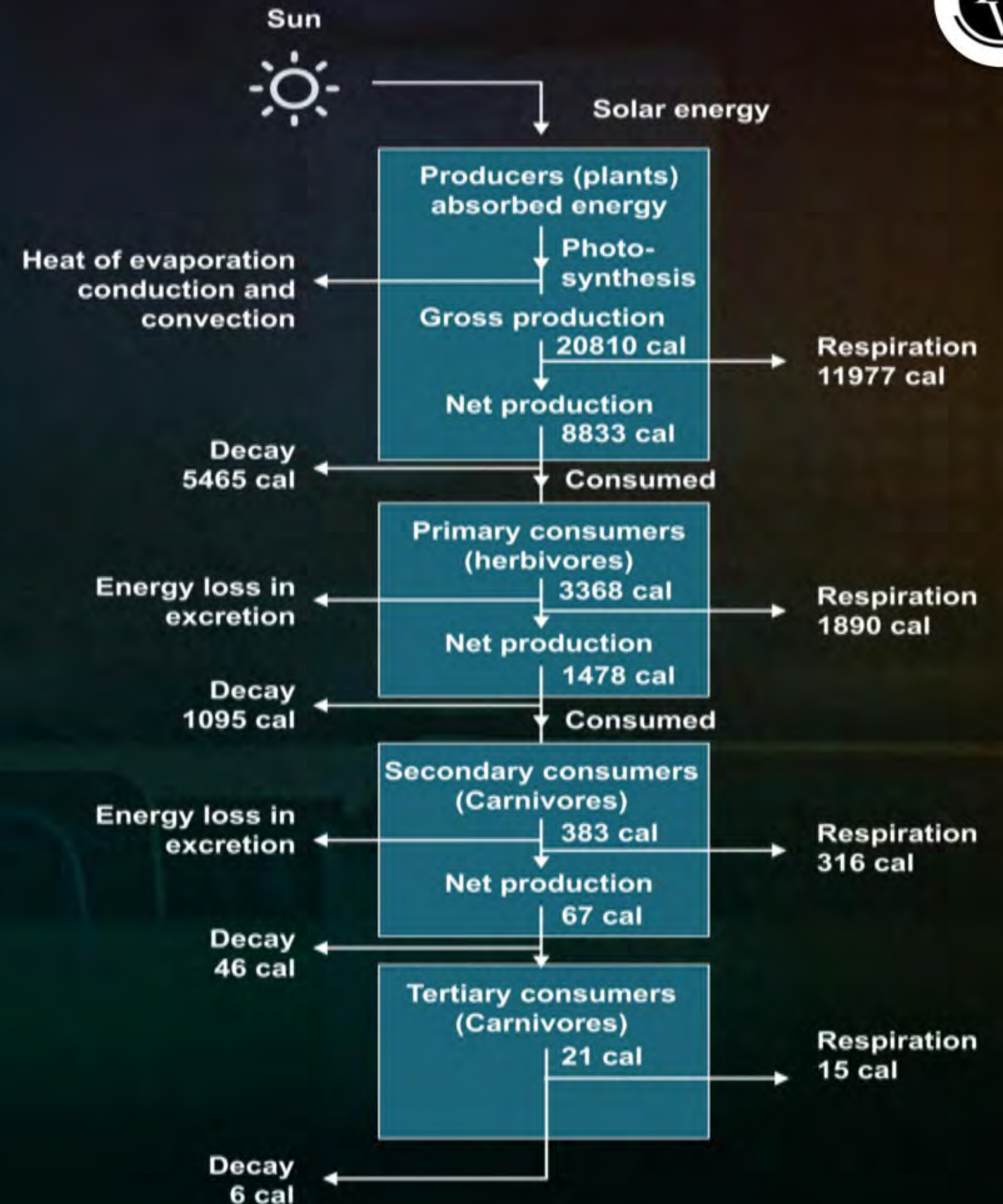




ENERGY FLOW

Out of the 21 cal energy obtained by the tertiary consumers, 15 cal energy is used in respiration and 6 cal energy is wasted in their decay.

The energy flow in ecosystems is thus linear i.e., it moves in a fixed direction. At the end, the energy reaches to the degraded (or unuseful) state.



Question



Food chain begins with:

- A** respiration
- B** photosynthesis
- C** decomposition
- D** decay

Question



Food chain begins with:

- A** respiration
- B** photosynthesis
- C** decomposition
- D** decay

Ans.

(B) photosynthesis

Question



The source of energy in an ecosystem is:

A sun

B decayed bodies

C green plants

D sugar

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of

Question



The source of energy in an ecosystem is:

- A** sun
- B** decayed bodies
- C** green plants
- D** sugar

Ans.

(A) sun

Question



Energy enters in a food chain through:

- A** primary consumers
- B** Secondary consumers
- C** tertiary consumers
- D** producers

Question



In an aquatic ecosystem, act as producers:

- A** small fishes
- B** plants
- C** krill
- D** large fishes

A
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Question



In an aquatic ecosystem, act as producers:

- A** small fishes
- B** plants
- C** krill
- D** large fishes

Ans. (B) plants



SOURCES OF ENERGY



Characteristics of a source of energy:

- A source of energy should be such that it can provide an adequate amount of useful energy at a steady rate over a long period of time.
- It should be safe and convenient to use, economical and easy to store and transport.



SOURCES OF ENERGY



Classification of sources of energy:

From the point of view of availability, the energy sources are divided into the following two groups:

- (1) renewable or non-conventional sources of energy, and
- (2) non-renewable or conventional sources of energy.



RENEWABLE OR THE NON- CONVENTIONAL SOURCES OF ENERGY

A natural source providing us energy continuously is called a renewable (or non- conventional) source of energy. Sun is the main source of energy for us on the earth.

Thus, the main sources of renewable energy are:

- (i) Sun
- (ii) Wind
- (iii) Flowing water (Hydro)
- (iv) Bio mass and bio fuels from waste
- (v) Tides
- (vi) Oceans
- (vii) Geo-thermal spots and
- (viii) Nuclear fuel.

- (i) **Sun as source of energy:** Sun is the main source of various types of energy. The energy obtained from sun is called the 'solar energy'. In the interior of the sun, nuclear fusion reactions generate huge amount of energy which is radiated out continuously in all directions in space. Since the sun is very far from the earth, we receive only a very small fraction of the total solar energy.

(ii) Wind as source of energy:

- ❖ The large mass of moving air is called wind. Due to motion, it has kinetic energy. **The kinetic energy of wind is called the wind energy.**
- ❖ Indirectly **wind energy comes from solar energy.** The sun rays falling on earth heat different areas of earth unequally. Due to
 - (i) **unequal heating of different areas of earth,**
 - (ii) **rotation of earth and**
 - (iii) **local convection currents, we have different wind cycles.**

- ❖ From the very early days, we have been using energy possessed by wind for various purposes such as in removing husk from grains, in propelling sail boats in rivers and seas, in moving vehicles for transportation and in windmills to draw water from the ground and to grind grains.

(iii) Flowing water as a source of energy:

- The kinetic energy possessed by the flowing water is called the hydro energy.
- Hydro energy too comes indirectly from the sun. The solar energy is responsible for water cycle in nature. Water in oceans, rivers, lakes, etc. absorbs solar energy and it then evaporates to form clouds. The clouds move due to air currents and ultimately water comes back on earth in the form of rain and snow.

- Man has been utilizing for centuries the energy of flowing water in rivers for rotating the wheels of water mill used to drive the flour mill in remote hilly areas and for transporting heavy logs of wood from forests in hilly areas to the downstream areas in planes.

(iv) Bio mass as source of energy:

- The wastes and dead parts of living beings like plants, trees and animals, is called bio mass.
- They contain carbon compounds. The chemical energy stored in the bio mass is called the bio energy.
- Thus, bio energy also comes from solar energy. Bio mass such as wood, cattle dung, crop residues and agriculture wastes like bagasse have been traditionally used as fuel to produce heat energy for domestic as well as commercial purposes.

(v) Tides as source of energy:

- The rise of ocean water near the coast is called high tide and fall of ocean water is called low tide. This rise and fall of tidal waves occur twice a day in oceans. The energy possessed by rising and falling water in tides is known as tidal energy.
- Tidal energy is harnessed for producing electricity by constructing a dam across a narrow opening to the sea. But this is not a major source of energy because of the following two reasons:
 - (1) The rise and fall of sea water during tides is not enough to generate electricity on a large scale.
 - (2) There are very few sites which are suitable for building the tidal dams.

(vi) Oceans as source of energy:

Water in oceans possesses energy in two forms:

- (a) ocean thermal energy and
- (b) oceanic (or sea) waves energy.

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(a) **Ocean thermal energy:**

- Water at the surface of an ocean gets heated by absorbing the heat of sun, while water at its deeper levels remains cold.
- Thus, there is a difference in temperature of water at the surface and at deeper levels of an ocean. This difference in temperature is found to be up to 20°C .
- The energy available due to the difference in temperature of water at the surface and at deeper levels of ocean is called the ocean thermal energy (OTE). Obviously, this energy also comes indirectly from the sun.
- Ocean thermal energy is harnessed for producing electricity by a device called ocean thermal energy conversion power plant (OCTEC power plant).

Thank You