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ENERGY FLOW THROUGH AN ECOSYSTEM*

Miranda Dudzik

Based on *Energy Flow through Ecosystems*¹ by
OpenStax College

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Abstract

By the end of this section, you will be able to:

- Describe how organisms acquire energy in a food web and in associated food chains
- Explain how the efficiency of energy transfers between trophic levels affects ecosystem structure and dynamics
- Discuss trophic levels and how ecological pyramids are used to model them

All living things require energy in one form or another. Energy is required by most complex metabolic pathways (often in the form of adenosine triphosphate, ATP), especially those responsible for building large molecules from smaller compounds, and life itself is an energy-driven process. Living organisms would not be able to assemble macromolecules (proteins, lipids, nucleic acids, and complex carbohydrates) from their monomeric subunits without a constant energy input.

It is important to understand how organisms acquire energy and how that energy is passed from one organism to another through food webs and their constituent food chains. Food webs illustrate how energy flows directionally through ecosystems, including how efficiently organisms acquire it, use it, and how much remains for use by other organisms of the food web.

1 How Organisms Acquire Energy in a Food Web

Energy is acquired by living things in three ways: photosynthesis, chemosynthesis, and the consumption and digestion of other living or previously living organisms by heterotrophs.

Photosynthetic and chemosynthetic organisms are both grouped into a category known as autotrophs: organisms capable of synthesizing their own food (more specifically, capable of using inorganic carbon as a carbon source). Photosynthetic autotrophs (photoautotrophs) use sunlight as an energy source, whereas chemosynthetic autotrophs (chemoautotrophs) use inorganic molecules as an energy source. Autotrophs are critical for all ecosystems. Without these organisms, energy would not be available to other living organisms and life itself would not be possible.

*Version 1.1: Oct 15, 2013 3:23 am -0500

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Editors: This column should contain about 1459 words.

From The DealsGuy For February 2010 by Bob (The Cheap skate) Click, Greater Orlando Computer Users Group

Our bank, Washington Mutual, was recently taken over by Chase via the FDIC. Our checking and a small savings account were with them, and a Home Equity Loan of just a few thousand. Although our original purpose for the HEL fell through, we had eventually borrowed a small amount for home improvements. We opened the HEL three years ago and have never been late or missed a payment. We usually pay a substantial amount on the principal as well as the monthly interest, but on a few occasions, we only paid the monthly interest, which you can do on a HEL. Shortly after Chase took over, we received a letter from them with two forms they wanted signed to enable them to get copies of our IRS returns for the last two years. They also demanded that we furnish them proof of our income.

I was appalled at the intensity of their demand and decided to ignore it; after all, our record is unblemished, and our FICO score is over 800 and we weren't asking for more money, so I didn't feel we were doing anything wrong? I expected to hear from them by phone, but instead, the next month brought a letter demanding we pay the loan off and there would be no financial penalty for early payment. I also ignored that one. I guess I could have paid it off, but paying money back to your savings does not always happen as planned, so I'm just continuing to pay on the loan, wondering what their next move will be. Am I some kind of criminal?

They then discontinued our credit line, which really doesn't matter to me. Now they're hitting us with extra fees for each payment, called "back dating fees." I've tried complaining to a couple of state agencies, but neither office has responded. My feeling is, beware of dealing with Chase. We're changing our checking to another bank, and since our utilities are automatically withdrawn, we're communicating with them to change bank accounts. The utilities tell me many of their customers are also complaining about Chase.

*Interesting Reading

Everyone is interested in Flash Memory technology these days, but few end users really understand what it's all about. Information Week had an interesting article that explains some of how it works along with the shortcomings, and what the future might bring. This article might fill in some blanks, but it's written for IT people so read it carefully. Sorry for the long URL, but some readers dislike tinyurls. They tell me they want to know where they're going when they click a URL.

<<http://www.informationweek.com/news/storage/systems/showArticle.jhtml?articleID=219501231&queryText=Howard%20Marks>>

Another interesting article in IW is about "The Internet of Things"; keeping track of all kinds of things, using RFID tags, and other types of information tags. It covers different topics and problems not covered in the RFID article I gave you recently, and might give you something to think about.

<<http://analytics.informationweek.com/abstract/25/1343/Virtualization/monitoring-technology-creates-internet-of-things.html>>

*Oops, Nobody Home

In my November DealsGuy column, I wrote about an interesting 3D address book with a discount. Two of my readers have told me they tried to order it, but were unable to do so, or even get a response to e-mail. We both tried to contact the PR person that I coordinated it with, but to no avail. They don't seem to respond at all and I have no idea why. I have that problem a lot with vendors who send out announcements for a new product, but when that happens I don't usually use that item, but in this case, I had several communications with the person and she assured me everything would work fine. I guess those things happen, but I can't help but feel bad. I'm still trying to contact them.

Name: _____

Solve the unit conversion problem by cross cancelling units.

9.5 grams = as centigrams	$\frac{9.5 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 950 \text{ cg}$
2.25 grams = as centigrams	$\frac{2.25 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 225 \text{ cg}$
6.5 grams = as milligrams	$\frac{6.5 \text{ g}}{1} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 6500 \text{ mg}$
5.75 grams = as centigrams	$\frac{5.75 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 575 \text{ cg}$
8.75 grams = as centigrams	$\frac{8.75 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 875 \text{ cg}$
3.25 grams = as milligrams	$\frac{3.25 \text{ g}}{1} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 3250 \text{ mg}$
3.75 grams = as centigrams	$\frac{3.75 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 375 \text{ cg}$
8.5 grams = as centigrams	$\frac{8.5 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 850 \text{ cg}$
4.5 grams = as milligrams	$\frac{4.5 \text{ g}}{1} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 4500 \text{ mg}$
1.25 grams = as centigrams	$\frac{1.25 \text{ g}}{1} \times \frac{100 \text{ cg}}{1 \text{ g}} = 125 \text{ cg}$

CLASS 9 Science Questions:

Discuss with a friend or family member the following questions and answer them. Write in a notebook a few lines (minimum 5 lines) for each question. The length of the answer should be at least 5 lines of the answer in the answer.

Define the difference between a hypothesis and a theory.

A hypothesis is a statement that can be tested through observation or experimentation. A theory is a well-substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment.

What are the stages of scientific investigation?

There are five stages in the scientific investigation:

1. Observation
2. Hypothesis formation
3. Prediction
4. Testing
5. Conclusion

What does a theory represent?

A theory is a well-substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment.

List the five kingdoms and their examples.

Monera: Bacteria, Cyanobacteria
Protista: Amoeba, Paramecium, Euglena, etc.
Fungi: Mushroom, Yeast, etc.
Plantae: Mango, Rose, etc.
Animalia: Human, Dog, etc.

List the properties of life.

1. Cellular Organization
2. Metabolism
3. Homeostasis
4. Growth and Reproduction
5. Mobility

Biological processes: nutrition, locomotion, and taxis.

Biological processes include nutrition, locomotion, and taxis. Nutrition is the process of obtaining and using food for energy and growth. Locomotion is the ability to move from one place to another. Taxis is the movement of an organism in response to an external stimulus.

List the levels of organization of life in order of increasing complexity.

1. Cell
2. Organ
3. Organism

What is biology in short answer. What is biology practical. Question of the pearl. What is biology all about.

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