

Student’s Learning Activities (Liebig and nutrition)

Activity 1

You will watch a video with narration or listen to a story from your teacher about Justus Von Liebig and his scientific work. Please write the most important points of the story according to your view and discuss them in your group (Indicative points of the narration: Liebig’s meat extract for the therapy of Emma Muspratt, the production of the meat extract,)

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Activity 2

Science in the mid 19th century occupied with how the workers could be supplied with energy for their work in factories. Max Rubner had argued that the law of conservation of energy could be proved to be valid also for humans or animals .

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“Rubner made efforts to distinguish between the efficacy of the human body to convert their energy into heat. Rubner identified proteins as the substance where the heat-to-energy ratio was least favorable in terms of producing workload from food. If one was a follower of the general ideas of the industrial age where the human body was placed into the intersection between energy, cost and workload, this was very convenient. The major source for proteins was meat which was expensive compared to crop or potatoes, these in turn being the major sources for carbohydrates.¹ And since “workers” should convert their “food” into “work” it seemed obvious that the expensive meat was by no means necessary for their balanced living but should be given as “brain food” to persons, who did an intellectual work.” (see the historical background of this lesson)

Please organise an argument in your group if the kind of food affects the muscles or the mental efficiency of people. Try to oppose to the Rubner’s opinion.

Fill up the table

1 Max Rubner, *Gesetze des Energieverbrauchs bei der Ernährung*, Leipzig 1902

The kind of the food affects the muscle or the mental efficiency of people			
We know about the theme that	We want to know about the theme	We will research in the resources	The way of documentation
1.			
2.			

Activity 3

Please visit this website: <http://cnx.org/content/m42153/latest/#import-auto-id1921441> and study the paragraphs Energy Conversion in Humans, Power Consumed at Rest, Power of Doing Useful Work. Study the example: Example 1: Calculating Weight Loss from Exercising and: a) each one of you choose one activity from those in table 2, b) calculate the time of exercise for this activity to “burn” 20 grams of fat.

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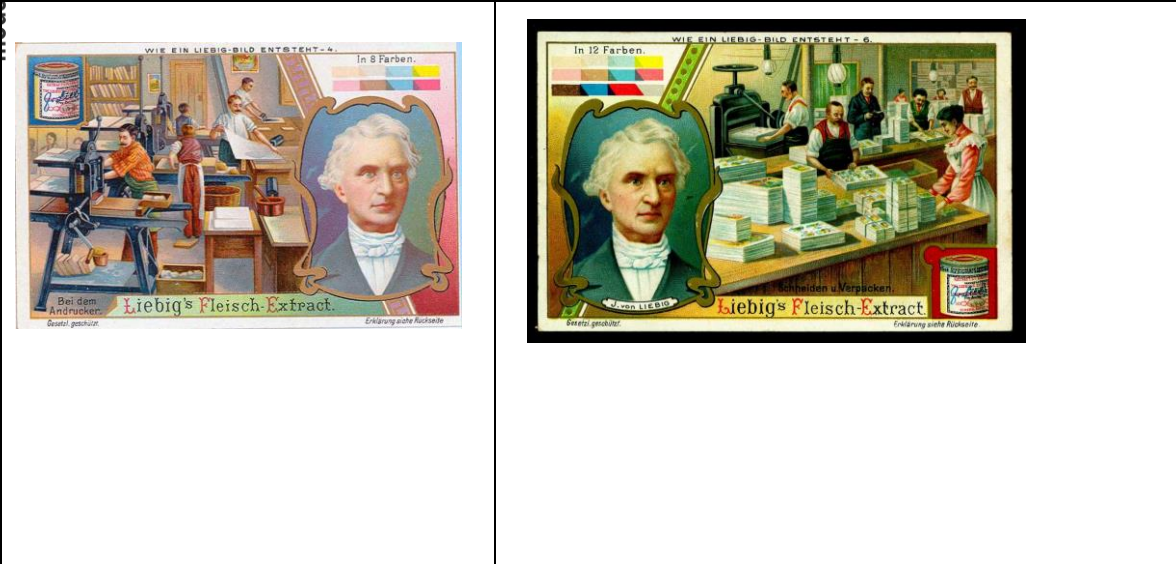
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Activity 4

The industrial production of Liebig’s meat extract was a poster. Please find more information in the website: http://blogs.princeton.edu/graphicarts/2007/09/from_beef_bouillon_to_chromoli.html#more



Activity 5

The meaning of Liebig's law of the minimum in the development of the plants is presented on the website:

http://www.avocadosource.com/tools/FertCalc_files/liebigs_law.htm

Based on this principle, what does define the development of a plant?

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Activity 6

The advertising material of an industry for the production of the fertilizers is quoted on the Liebig's Law of the Minimum.

The image from the website:

http://www.faqs.org/sec-filings/120606/MOSAIC-CO_8-K/d363718dex991.htm

Crop Nutrients Overview

- Crop nutrients are plant food
- 17 chemical elements are required for plant growth

Non-Mineral Elements	Macronutrients		Micronutrients	
	Primary	Secondary		
C - Carbon	K - Potassium	Ca - Calcium	B - Boron	Mn - Manganese
H - Hydrogen	N - Nitrogen	Mg - Magnesium	Cl - Chlorine	Mo - Molybdenum
O - Oxygen	P - Phosphate	S - Sulphur	Cu - Copper	Ni - Nickel
			Fe - Iron	Zn - Zinc

- Justus von Liebig's Law of the Minimum
- N-P-K: the carbohydrates, protein and fat of a plant's diet
- Growing importance of secondary nutrients and micronutrients
- Nutrients delivered in a variety of crop nutrient products

Liebig's Barrel



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Activity 7

In the 19th century, the use of the fertilizers changed the agriculture and the production of the foods, radically. But today, it is confronted by skepticism.

Please discuss in your team about the reasons of the skepticism.

Design a research in order to answer the benefits and the harms of the use of the fertilizers.

Fill the table

About the fertilizers and the benefits and the harms which are caused.			
We know that	We want to know about the fertilizers	We will research in the resources	The way of documentation
1.			
2.			

Activity 8

Using the following list of ideas that describe the characteristics of science and the ways it develops, and scientists call “Nature of Science” (NOS) try to locate some of them in the story you heard and the above activities of this lesson (McComas (2004).

Characteristics of Nature of Science (NOS)

1. Science demands and relies on empirical evidence.
2. Knowledge production in science includes many common features and shared habits of mind.
3. Scientific knowledge is tentative but durable.

4. Laws and theories are related but distinct kinds of scientific knowledge.
5. Science is a highly creative endeavour.
6. Science has a subjective element.
7. There are historical, cultural, and social influences on science.
8. Science and technology impact each other, but they are not the same.
9. Science and its methods cannot answer all questions.

Scientists argue that in order to learn science one must first understand what exactly science is. Because it is difficult to define science, scientists give a list of its characteristics.

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Activity 9 (proposed for home work)

With the following designs which visualize the mechanism of weight increase in a child (Source of the design): <http://www.39kf.com/cooperate/qk/American-Society-for-Nutrition/017302/2008-12-28-549878.shtml>

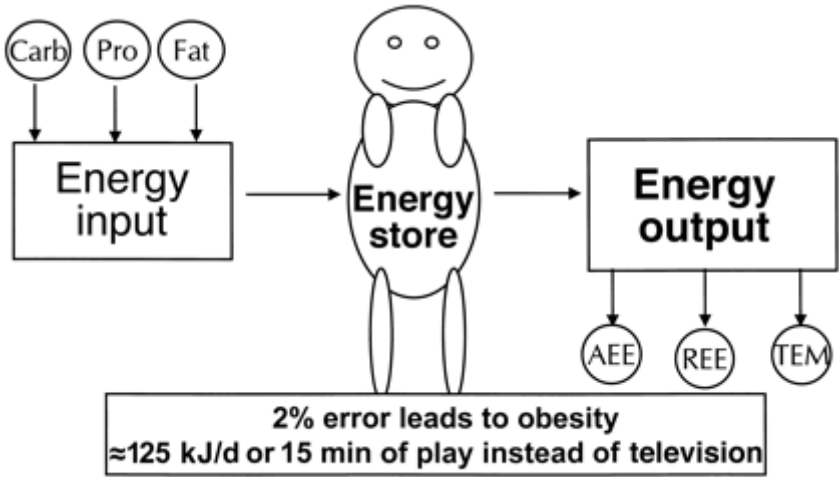


FIGURE: The components of energy balance. Carb, pro, and fat represent energy input from carbohydrate, protein, and fat, respectively. AEE, activity energy expenditure; REE, resting energy expenditure; TEM, thermal effect of feeding.

Please try to create a dictionary with the terms which are quoted in the picture and the legend. Present a poster about the obesity and the physical exercise.

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