

BSCS Biology An Ecological Approach

Chapter 15 The Human Animal: Food and Energy

*Once upon a time you didn't know what to choose
But now there's a guide full of every food
It's the food pyramid
It's the food pyramid
The higher you climb, the less you need
It's the food pyramid*

From Cathy Fink and Marcy Marxer's *Bon Appetit*

Introduction

In this chapter (conveniently packaged into five days), study is first on the process of human digestion and culminates with an important discussion of eating disorders.

The Process of Eating and Digestion

The food processing journey in humans begins with **mechanical digestion**, that is, the chomping and chewing of food. Once the food makes its way from the mouth down the **esophagus** to the stomach, real **chemical digestion** begins. **Gastric juices**, which are acidic in nature, begin the **chemical breakdown** of food which then moves through a **sphincter** to the **small intestine**. The small intestine is a tube with many convoluted twists and turns and protruding structures known as **villi**. The villi help to increase the surface area for the absorption of nutrients into the bloodstream. Unfortunately there is no control function in the digestive process to limit the amount of **nutrients** absorbed. In other words, the more one eats, the more nutrients absorbed. Finally, the remaining waste products left after nutrient absorption pass through the **large intestine** where water is reabsorbed into the body. Waste is eliminated from the body as **feces**.

Respiration in the Cells

Human cells need food material in digested solutions to function and grow. These materials come to the cells in the form of **amino acids**, **single sugars**, **fatty acids**, and **glycerol**. Food molecules are also converted into ATP. Most of these reactions take place in the **mitochondria** of the cells. **Carbohydrates** are the primary source of **energy** in the respiration process. **Fats** and **proteins** are also sources of energy. All of these materials along with **vitamins** are essential in a healthy diet.

Diet and Health

The human digestive system has evolved to adapt to the food consumed for many years. Only recently has the human **diet** changed radically. As a result there are associated problems with poor diet. Some of these problems include **obesity** and **heart disease**. **Processed foods**, foods low in **fiber**, and **overeating** all contribute to these problems. It is necessary to understand that a diet including **vegetables**, **fruits**, whole **grains**, and foods rich in **protein** is essential for good health. The **food pyramid** is a graphic picture of good eating practices. Suggested foods on the food pyramid are somewhat variable in relation to various cultures.

Eating Disorders

Dieting is a common phenomenon in the United States. There has also been an increase in several common eating disorders. **Anorexia nervosa** (literally starving oneself) and **bulimia** (binge eating and induced vomiting or purging) are disorders found primarily in **adolescent girls**. Scientists agree that these conditions are most often psychological and related to self-esteem among other factors.