NSTA – National Science Teachers Association

Science of Food Safety SciPack – Science Objects/Table of Contents

Science Object – Food Safety and You

Introduction

Food Safety: Past and Present

Personal Food Safety

Public Policy and Technology

Science Object – Growth and Reproduction of Cells

Introduction

The Chemistry of Cells

Requirements for Reproduction

Variation and Selection

Science Object – Microbes, Friend or Foe

Introduction

Most Interactions Are Good

Avoiding the Bad

Dealing with the Ugly

Science Object – Understanding the Cells Importance

Introduction

Life's Starting Point

How Cells Function

Bacteria Are Everywhere

Setting the Stage

An occasional sick student in class would not be cause for concern. But what happens when there is an outbreak of illness in the larger community? Where do we look for clues as we search for the cause of the illness? How can we keep it from spreading? And can we prevent such an outbreak from happening again?

Consider the following map of outbreaks of *Salmonella* in June and July 2007.

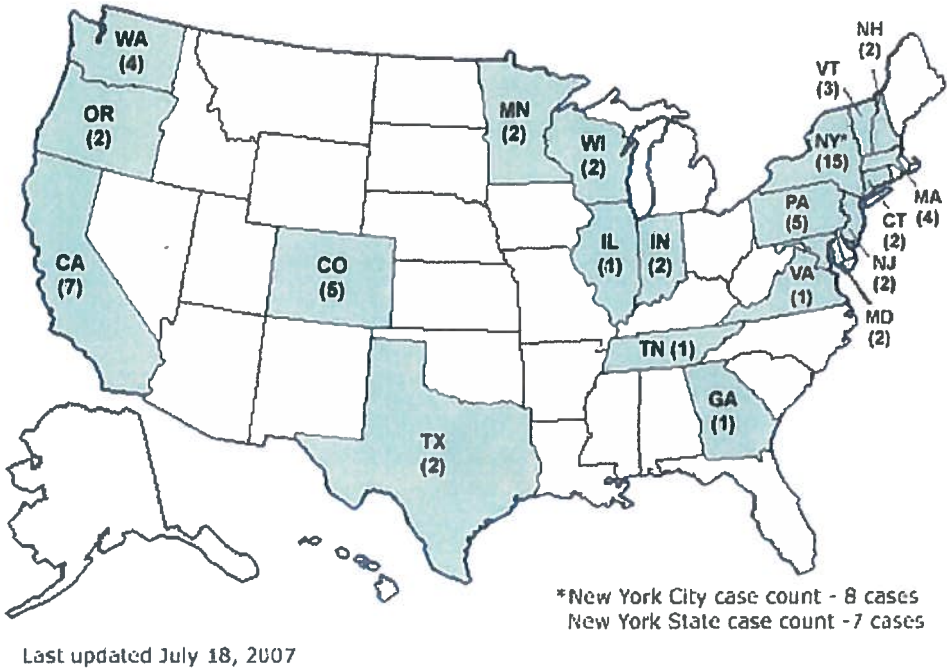


Figure 1.1. *Salmonella* outbreak map.

Does there appear to be a pattern in the Salmonella outbreaks reported in June and July of 2007?

Check Your Thinking

Whenever there is a significant outbreak of foodborne illness, public health officials and scientists from the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) leap into

action. Like detectives, they track the illness back to its source by investigating the history and identifying the underlying cause of the outbreak.

In the *Food Safety and You* Science Object you will observe how scientists investigate reports of foodborne illness and the actions that citizens can take to limit or prevent food contamination and outbreaks. In particular, you will explore:

- Advances in our ability to understand the causes of foodborne illness
- Simple methods for preventing foodborne illness, and why these methods work
- How science has influenced the development of new technologies to help us combat foodborne illness

Press "Next" at the top of this window to go on to *Food Safety: Past and Present -- The Beginnings of Food Safety*

Development of the NSTA *Food Safety and You* Science Object is made possible with support from:

FDA

The Best Defense Is a Good Offense

Humans have always recognized that some things in our environment can make us ill. We may not have known exactly what was going on, but we could figure out that when we ate certain substances, we got sick. Knowing this, we began to develop habits and counterattacks in an attempt to defeat these disease-causing agents, which include "germs." The slide show below illustrates some of the methods we've used to control the spread of disease-causing microbes and reduce or prevent the damage they can produce.

1 of 4

Wash your hands. Your kindergarten teacher was right: the act of washing your hands, especially with hot soapy water, can help you rub microbes off your hands and down the drain. Soaps and hot water pick up and carry potential pathogens away; the heat of the water may serve to kill some of them.

Which of the following allows us to prevent illness by using dead or weakened bacteria or viruses?

- antibacterial soaps
- antibiotics
- washing your hands with warm water
- immunizations

Check

Tries Remaining: 2

The overuse of antibiotics can lead to bacteria that are _____.

- resistant
- mutations
- mutations

Check

Tries Remaining: 2

Email Help from a Science Content Mentor

Remember, unlimited email support from a content expert is available to all SciPack users by clicking the 'Ask a Mentor' button at the top of each page. If you are viewing a free Science Object, you can have access to the content expert by purchasing the *Science of Food Safety* SciPack.

Although you may think that handwashing was the original method used to combat foodborne illness, it is actually a fairly new practice, adopted only about 30 years ago as an important part of daily life for preventing the transfer of germs. And we probably all could stand to take handwashing more seriously, even today!

The earliest method of fighting pathogens was through preservation of food, by salting and using other methods that reduced the likelihood of bacterial growth. Basically, early preservation techniques deprived disease-causing organisms of water, thereby preventing them from

"setting up shop" and "making a living" by breaking down food substances.

Through research, scientists have supported what numerous cultures have known all along—certain spices can prevent bacteria from growing. Identify the geographic locations where spicy food is favored, and it makes sense that there must be a reason for using spices beyond simply adding taste to food. Examine the following graph to see if you can find any correlation between where spices are used, the foods they're used on, and the environmental conditions that might be conducive to bacterial growth.

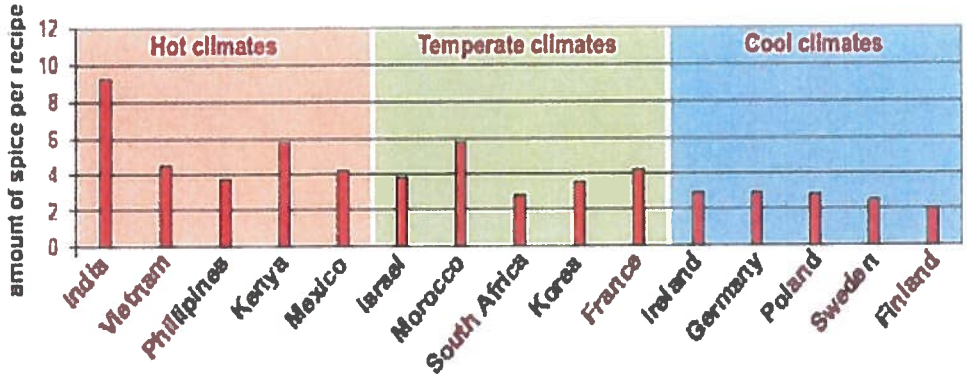


Figure 3.2. Number of spices used in meat-based recipes by country and climate type.

Which countries tended to use the most spices, and why do you think this is so?

Check Your Thinking

We've been engaged in a struggle with bacteria and other disease-causing microbes throughout our history. Humans, like all living things are not immune from the process of evolution. Bacteria and other disease-causing organisms are a challenge in our environment that provides a selective pressure on humans to deal with microbes that cause disease. This pressure has resulted in our evolving adaptations that allow us to confront the onslaught of microbial attacks. We've looked at some of these adaptations that serve as physical barriers. In the next section we will consider other aspects of the immune system, which is the primary adaptation we rely on to give us an advantage in the struggle against disease-causing microbes.

Press "Next" at the top of this window to go on to *Dealing with the Ugly -- Intruder Alert!*

NSTA – National Science Teachers Association

Nutrition SciPack – Science Objects/Table of Contents

Science Object - What Is Food?

- Introduction
- The Role of Food
- Sources of Food
- Nutrients in Food

Science Object - What Happens to the Food I Eat?

- Introduction
- From Food to Waste
- Input and Output Between Systems
- From Molecules to Energy to Structures

Science Object - What Are Nutrients?

- Introduction
- Nutrients the Body Needs
- Too Much or Too Little
- The Importance of Water

Science Object - What Choices Lead to a Healthy Lifestyle?

- Introduction
- Nutrient and Calorie Needs Vary
- Factors Affecting Food Choices
- Scientific Evidence to Guide How You Eat
- Using Food Guides and Labels to Eat Right

Introduction

Introduction

Every living thing needs nutrients for energy, as well as to grow, rebuild, and regulate life processes. And, it is not uncommon for advertisements to make extraordinary claims about the nutrients in food and the benefits they can provide. At times, understanding nutrients and why they are important can seem like the proverbial can of worms: convoluted and maybe a bit hard to understand where to begin. However, when it comes to nutrients and your health, it is important for you to understand what the basic nutrients are, how much of each nutrient you need, and why they are required for leading a healthy active life.

"All the nutritional benefits of regular worms without the hassle of having to get up early."

Figure 1.1. Cartoon showing birds with a can of worms. Used with permission.

In the *What Are Nutrients?* Science Object, you will explore the six nutrient groups important to life. In particular, you will be able to:

- Identify different categories of nutrients the body needs and their functions, including carbohydrates, fats, proteins, vitamins, minerals, and water
- Explain that each nutrient consumed is an input into a system and that too much or too little of any single nutrient can affect the parts and the whole of the body system and ultimately impact health
- Discuss why consuming a variety of nutrients in the right amounts during the day, or over several days, provides the materials and energy the body needs for all the activities it undertakes
- Identify foods that provide significant amounts of specific nutrients
- Describe the role of water in human health, including carrying

nutrients and providing the environment for physiological functions

Press "Next" at the top of this window to go on to *Nutrients the Body Needs -- Getting Nutrients*

Development of the NSTA *What Are Nutrients?* Science Object is made possible with support from:

FDA

Are You What You Eat?

You have probably heard the old saying, "You are what you eat." Certainly many aspects of your life and health are influenced by the ***nutrients*** and energy in the food you eat. You need to get the right amounts of nutrients and ***calories*** from your food to support the basics of ***metabolism***. Nutrients from the food you eat provide you with enough raw materials and energy for the repair and growth of your body's cells, as well as allow you to live a healthy, active life. But how do you know what is in each food you eat? What kinds of nutrients and how many calories are in a specific amount of a food? How does this need vary based on things like age, gender, and other individual requirements? And why is this information important to know?

Figure 2.1. Cartoon of diners with heads shaped like the food they are eating.

To begin to answer these questions, let's start with a case study, using the student from the Introduction. We'll call her Amber. Amber provides you with a list of the amount and kinds of meals she eats on a typical day. She also provides you with information about her height, weight, age, and level of physical activity. You will use this information and the activities that follow to determine how well Amber is eating and how she might improve.

Figure 2.2. You Are What You Eat.
For those unable to engage with the interactive component, select this link for a text description:
Text Description

Q Is there any type of food that is not part of Amber's eating plan?

- Fruits
- Oils
- Milk
- Meat and Beans
- Vegetables
- Grains
- She's eating something for each type of food.

Check

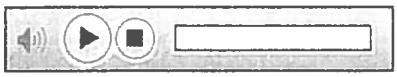
Tries Remaining: 3

Q Which of the following could Amber eat less of to reduce her total calorie intake in order to come closer to her daily recommendations for that food group? Check all that apply.

- [ ] Fruit
- [ ] Milk
- [ ] Meat and Beans
- [ ] Vegetables

Check

Tries Remaining: 3



The nutrients Amber gets from her food choices provide the materials and energy that her body needs for normal functioning, for growing, for movement, and for maintaining health. The saying, "You are what you eat," really holds true. Ideally, what you eat begins with an eating pattern that includes the major food groups and oils, and enough calories (without overdoing) to provide the nutrients and the energy you need. But this is just the beginning. In the next section, you will look at age and gender more closely and how they affect nutrient and calorie recommendations.

Press "Next" at the top of this window to go on to *Age and Gender*