LECTURE # 3
Please review the images of the next lecture and of any past lecture at:

HTTP://OLLI.FULLERTON.EDU//CLASSES/SCIENCE_AND_TECHNOLOGY/WORLDRESOURCES.PHP
The World, its Resources, and Humankind. Topics of Study

- The World
- Place, History, Economy, Politics
- Resources FOOD
- Humankind
FOOD
“Civilization, as it is known today, could not have evolved, nor can it survive, without an adequate food supply”

Norman Borlaug
(1914-2009)
“Food is the moral right of all who are born in this world”

Norman Borlaug
(1914-2009)
Plan of Discussion

1. Timeline of Foods
2. Nutrition
3. Digestion
4. Types of Food
5. Alcoholic beverages
TIMELINE OF FOOD
Timeline of Food
Prehistoric Times

2,000,000 BC - Consumption of meat
250,000 BC - Hearths appear – *Invention of cooking*
40,000 BC - Fish consumption – East Asia
30,000 BC - *Earliest flour*
25,000 BC - *Earliest fish hook*
12,000 BC - *Oldest domesticated rice* – China
9,000 BC - Figs – Jordan valley
8,500 BC - *First agricultural revolution* – Middle East
8,000 BC - Squash – Mexico
8,000 - 5,000 BC – Banana cultivation – Papua
8,000 - 5,000 BC – Domestication of potato South America
Major Formative Events in the Neolithic Era
(Mesopotamia, Nile's banks, Indus River valley, and major rivers of China)

By 10,000 BC humans colonized all ice-free parts of the globe.

Future of humankind was molded by:

- **Domestication** of animals and plants

- **Agriculture** - developed - c. 8000 - 5000 BC. ⇒ Man settled becoming a farmer

- The **wheel** - invented - 6500 - 4500 BC in Mesopotamia ⇒ facilitated transportation

- **Navigation** – from rivers to the sea. *Trading resources and ideas*

- ⇒ **Discovering** ⇒ **Conquering**
Major Formative Events in the Neolithic Era (cont’d)

• Agriculture and the wheel make the greatest human progress
• Accounting became necessary

• **Writing invented** - 3500 BC ⇒ Accounting ⇒ Communication

• Grains in excess of the need

• Social classes ensued ⇒ “Haves” and “have-nots”
• Creation of **city-states** and military for defense
• “Have nots” revolts or **Outsiders’** invasions

• **Destruction and rebuilding became the norm**
Timeline of Food (I)
Neolithic Times

~7,000 BC – **Cereal production** – Syria. Rice and millet in China
   Wheat and barley in Pakistan
~7,000 BC – Brewing fermented alcoholic beverage. Wine in Georgia
~7,000 BC – Sheep domesticated – China
~6,800 BC – **Rice domesticated in SE Asia**
~6,140 - 4530 BC – Fish processing and storage – Israel
~6,000 BC – Granary in Mehrgarh (Pakistan)
~5,500 BC – Cheese making – Poland
~5,000 BC – Cattle domesticated – Mesopotamia
Timeline of Food (2)
Neolithic Times

~5,000 BC – Beans cultivated – Americas
~4,000 BC – First use of wooden ploughs in Mesopotamia
~4,000 BC – Leavened bread – Egypt (yeast used)
~4,500 - 3,500 BC – Olive domestication and olive oil extraction
~4,000 BC – Agriculture reaches NE Europe
~4,000 BC – Citron seeds – Mesopotamia
~3,900 BC – Early evidence of beer from barley – Mesopotamia - oldest surviving beer recipe
~3,600 – Aquaculture – China
~3,000 BC – Grapes for wine – Fertile Crescent
~3000 BC – Sugar produced in India
~3,000 – **Sunflower** – N. America
~3,000 BC – Turmeric, cardamom, pepper, mustard – Harappa (Indus valley)
~3,000 BC – Beer in Europe by Germanic and Slavic tribes
~2,500 BC – Domestic pigs from wild boars – Hungary
~2,000-1,500 BC – **Rice cultivation** – Ganges valley
1,700 BC – **Wind powered machine** - Babylonia
~1,900 BC – Chocolate drinks – Olmec
Timeline of Food
Antiquity (2)

600 CE – Distillation of alcohol invented in China
607 CE – Massive canal btw. the Yellow and Yangtze rivers
691 BC – **First aqueduct in Niniveh** (N. Assyria, on Tigris)
530 BC – Tunnel of Eupalinos (Island of Samos, Greece)
500 BC – **Iron plough invented in China**
500 BC – Garum (fermented fish sauce = condiment) – Rome and Greece
327-324 BC – **Alexander Macedon brings rice from India**
100 BC – Seed-drill invented in China
Middle Ages

Primitive cooking $\Rightarrow$ Poor nutrition $\Rightarrow$ **Diseases of deficiencies:** Ricketts, scurvy, beriberi, pellagra

**Use of spices** to cover poor taste $\Rightarrow$ Major commerce

Slow progress in agriculture

**Benedictine abbey’s wines** $\Rightarrow$ Surviving vineyards
Modern Technological Advances

1809 – Nicole Appert (French confectioner) - **canning**
1866 – Gregor Mendel – **Mendelian inheritance**
1871 – Louis Pasteur – invented **pasteurization**
1895 – **Refrigeration** for food preservation – USA and UK
1944 – **Green Revolution (N. Borlaug)** - started in Mexico
1974 – China creates hybrid rice
2000 – **Genetically modified plants** cultivated around the world
“The Green Revolution”

1940s-1950s - Dr. Norman Borlaug’s “Green Revolution”

1990s - First GMO crops introduced into the marketplace

2012 - More than 420 Mil. acres of biotech crops in 28 countries by 20 million farmers

↓

100% increase in crops since 1990s
NORMAN BORLAUG (1914 – 2009)
Father of the “Green Revolution”
COULD ALL PEOPLE BE FED?
World Population - 10,000 BC – 2000 CE
<table>
<thead>
<tr>
<th>Country</th>
<th>Output (Billions USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1,088</td>
</tr>
<tr>
<td>India</td>
<td>413</td>
</tr>
<tr>
<td>European Union</td>
<td>333</td>
</tr>
<tr>
<td>United States</td>
<td>290</td>
</tr>
<tr>
<td>Indonesia</td>
<td>127</td>
</tr>
<tr>
<td>Brazil</td>
<td>110</td>
</tr>
</tbody>
</table>
Acquired Problems in Agriculture

1. Soil
2. Water
3. Chemical fertilization
   + Agricultural pollution
4. Pesticides
AGRICULTURAL POLLUTION

Chemical Fertilizers (> 150 tons/yr.)

- ↓ soil microorganisms and small mammals
- ↓ insects and organic matter

Phosphates ➔ algal growth in water
Nitrates ➔ toxic, carcinogenic

Pesticides: Arsenic compounds
- Plant parts
- Petroleum products ("dirty dozen")
- ↑ Breast cancer (Hawaii)
CHLORINATION BY-PRODUCTS

Chlorine + natural organic substances present in untreated water $\Rightarrow$ Trihalomethanes (THM’s)

THM are organohalogen compounds derivatives of methane

Ecological studies: Bladder, colon, rectal, lung, brain cancer
TIMELINE OF FOODS
GRAINS
Sumerian Harvester’s Sickle Made of Baked Clay - c. 3000 BC
Threshing in Ancient Egypt
Threshing of Grain, 14th Century
Rice terraces in the Philippines
The Harvesters – Peter Bruegel, 1565
Ancient American Crops

Cereals: maize (corn), barley
Pseudo-cereals: Quinoa, sunflower
Pulses: Beans, peanuts
Fiber: Cotton, yucca, agave
Roots: potatoes, jicama, many tubers
Fruits: Tomatoes, peppers, avocados, many sorts of berries, papayas, passion fruit
Melons: Squashes
Nuts: Peanuts, walnuts, pecan, and others
Meat and Poultry: Turkey, bison
Other: Tobacco, vanilla, cocoa, chocolate, rubber
### Timeline of American Crop Cultivation

<table>
<thead>
<tr>
<th>Date</th>
<th>Crop</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7000 BC</td>
<td>Maize</td>
<td>Mexico</td>
</tr>
<tr>
<td>5000 BC</td>
<td>Cotton</td>
<td>Mexico</td>
</tr>
<tr>
<td>4800 BC</td>
<td>Peppers, squash, avocados</td>
<td>Mexico</td>
</tr>
<tr>
<td>4000 BC</td>
<td>Beans</td>
<td>Mexico</td>
</tr>
<tr>
<td>4000 BC</td>
<td>Nuts</td>
<td>South America</td>
</tr>
<tr>
<td>2000 BC</td>
<td>Sunflowers, beans</td>
<td>South America</td>
</tr>
</tbody>
</table>
American Crops
Corn, a Staple in Mayan Diet
Meat Preservation

>10,000 BC - Ice packing
4500 BC - Sun drying
3500 BC - Fish preservation (Sumerians)
3000 BC - Salt curing - from the Dead Sea – (Jews)
200 CE - Meat cured with salt (Greeks and Romans)
1300 - Meat cured with salt (Chinese)
1590 - Meat smoked (Indians)
Meat Preservation (cont’d)

1809 - **Canning**

1934 - **The refrigerator invented**

1940 - Fermenting meat for sausages \(\Rightarrow \downarrow \text{pH} \Rightarrow \downarrow\) bacterial growth

1960 - Irradiation

1989 - Thermal heating

1993 - Solar drying

2000+ - **Chemical preservation**
## Nutritional Content of 4 oz. of Meat

<table>
<thead>
<tr>
<th>Source</th>
<th>Calories</th>
<th>Protein</th>
<th>Carbs</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>110–140</td>
<td>20–25 g</td>
<td>0 g</td>
<td>1–5 g</td>
</tr>
<tr>
<td>Chicken</td>
<td>160</td>
<td>28 g</td>
<td>0 g</td>
<td>7 g</td>
</tr>
<tr>
<td>Lamb</td>
<td>250</td>
<td>30 g</td>
<td>0 g</td>
<td>14 g</td>
</tr>
<tr>
<td>Steak (beef top round)</td>
<td>210</td>
<td>36 g</td>
<td>0 g</td>
<td>7 g</td>
</tr>
<tr>
<td>Beef (T-bone)</td>
<td>450</td>
<td>25 g</td>
<td>0 g</td>
<td>35 g</td>
</tr>
</tbody>
</table>
Meat consumption in United States

American consumption of chicken and beef rose substantially after World War II, aided by the development of intensive farming methods, the proliferation of fast-food restaurant chains and supermarkets and the adoption of reliable home refrigeration. Beef consumption peaked in 1976 but then declined, in part because of the publication of new dietary guidelines and studies that associated saturated fats and cholesterol with heart disease.

INCREASE IN MEAT CONSUMPTION AFTER WW2 DUE TO: HOME REFRIGERATION, INTENSE FARMING METHODS, SUPERMARKETS AND RESTAURANTS
Diet: Limit Fats and Calories

Correlation Between Meat Consumption and Colon Cancer Rates in Different Countries

Number of cancer cases (per 100,000 people)
Fish Preservation

Since antiquity: Fish curing by drying, salting, smoking, and pickling

19th century – Canning (sardines)

Modern times - Freezing
Eating Fish

Important nutrient. To eat at least once a week

1. Proteins
2. Omega-3 fatty acids (salmon, trout, tuna, mackerel, sardines)
3. Vitamin D
4. Iodine
   • Prevents heart attacks, strokes (~15% less)
   • Helps in the development of brain and eyes
   • Protects from age-related deterioration
DAIRY PRODUCTS
Dairy Products
Dairy Products

Milk is a **complete food**: Protein, fat, carbs, vitamins

Standardized by the fat level and fermentation:

- Cream
- Butter
- Cheeses
- Yogurt, etc.

To be avoided in presence of lactose intolerance and allergy.

No connection with cardiovascular disease (excluding butter).
NUTRITION
Hippocrates of Cos (Greek, ~400 BC)

"Let Thy Food Be Thy Medicine and Thy Medicine Be Thy Food"

“A Wise Man Should Consider that Health Is the Greatest of Human Blessings”
Definition

The process of nourishing or being nourished, especially the process by which a living organism assimilates food and uses it for growth and replacement of tissues. **Nutrients** are substances that are essential to life, which must be supplied by food.
Nutrition through the Dark Ages

Many fallacies

Witchcraft

Example: Treatment of eye disease:

Squeezing the juice of liver into the eye was effective

(Vitamin A is stored in the liver in large amounts)
1500s - Leonardo da Vinci compared the process of *metabolism* in the body to the burning of a candle.


**Lime juice prevented scurvy**
(Lime juice contains vitamin C)

**Vitamin C was discovered only in 1930.**
Antoine Lavoisier (French, 1743 - 1794)
Father of Chemistry and Nutrition
Discovered the Basal Metabolism and Oxidation of Food as Source of Body Temperature
Modern History of Nutrition

Early 1800’s – Discovery: Foods are composed primarily of four elements: carbon, nitrogen, hydrogen, and oxygen. Methods were developed for determining the amounts of these elements.

1840 -- Justus Liebig of Germany, was the first to point out the chemical makeup of carbohydrates, fats and proteins.
Christiaan Eijkman, a Dutchman working in Java: Some of the natives developed Beriberi (heart problems and paralysis). Chickens fed the native diet of white rice also developed the symptoms of Beriberi. He fed the chickens unprocessed brown rice (with the outer bran intact), they did not develop the disease. Eijkman then fed brown rice to his patients and they were cured. Nutritionists later learned that the outer rice bran contains vitamin B1, also known as thiamine.
Discovery of Vitamin A

1912 - E.V. McCollum, (USDA at the University of Wisconsin) - Widespread discovery of nutrients.

He discovered the first fat soluble vitamin, **Vitamin A**. He found that rats fed butter were healthier than those fed lard, as butter contains more Vitamin A.
Vitamins

1912 - Dr. Casmir Funk was the first to coin the term **vitamins**, substances that could prevent the diseases of scurvy, beriberi and pellagra (a disease caused by the deficiency of niacin (vitamin B-3)).

“Vital amines” ⇔ **Vitamins**

1930’s - William Rose discovered the **essential amino acids**, the building blocks of proteins.
1940’s - The water soluble **vitamins B** and **C** were identified.

1968 - Linus Pauling, Nobel Prize winner in chemistry, advised taking large amounts of vitamin C

Large amounts of vitamin C ⇒ No major effect
Vitamins and Minerals

1950s to the Present - The roles of essential nutrients as part of bodily processes have been brought to light.

The role of vitamins and minerals as components of enzymes and hormones that work within the body.
Detoxifying Agents

Removal of toxic substances from a living organism

- Antioxidants
- Alcohol detoxification
- Drug detoxification
- Metabolic detoxification
- Hemodialysis
- Chelation therapy

- Detox diets = No scientific support
Antioxidants

A paradox of human metabolism:
The vast majority of life processes require oxygen, yet oxygen is a highly reactive molecule that damages living organisms by producing reactive oxygen species (ROS).

Organisms contain a complex network of antioxidant metabolites and enzymes that work together to prevent oxidative damage to cellular components.

Reactive oxygen species (radicals) are incriminated in cancer.
Antioxidants (cont’d)

Best antioxidants (AO) are from fruits and vegetables

**Vitamins A, C, and E** from fruits and nuts, respectively

**Berries:** blueberries and blackberries are highest in AO.

**Flavonoids:** Red wine, dark chocolate, tea
Blackberries – Polyphenol antioxidants
## Nutritive Cancer Chemopreventive Agents

<table>
<thead>
<tr>
<th>Agents</th>
<th>Major Food Source</th>
<th>Mode of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>Vegetables, fruits</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Fruits (citrus), vegetables</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>Vegetable oils</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Selenium</td>
<td>Meat, eggs, dairy products</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Calcium</td>
<td>Dairy products</td>
<td>Binds bile and fatty acids</td>
</tr>
</tbody>
</table>
THE DAWN OF MOLECULAR EPIDEMIOLOGY OF HUMAN CANCER

"NO ONE SUPPOSES THAT ALL THE INDIVIDUALS OF THE SAME SPECIES ARE CAST IN THE VERY SAME MOLD"

C. Darwin, 1859
NUTRITION AND THE HUMAN BODY
The Food Pyramid

The first food pyramid was published in Sweden in 1974. The food pyramid was introduced by the USDA in 1992. It was called the "Food Guide Pyramid". It was updated in 2005 and then replaced by “My Plate” in 2011.
“MyPlate” – USDA 2011
DIGESTION (I)
The assembly of physical, chemical, and biological processes that make possible for the food to give us the needed energy, growth, and cell repair.

PROCESSES:

Physical: Mechanical, watering
Chemical: Enzymes
Biological: Absorption
DIGESTION (II)

Mechanical process (chewing in the mouth), churning the food in the stomach.

GI Juices added to soften the foodstuffs and enzymes split the nutritional stuff into absorbable chemical entities:

Carb. ➢ glucose – absorbed in the gut
Fats ➢ fatty acids – absorbed in the gut
Proteins ➢ amino-acids – absorbed in the gut

Most of the water is absorbed in the large bowel
METABOLISM

All the chemical processes aimed to maintain the cellular homeostasis

Catabolism = breaking down the molecules to obtain energy

Anabolism = synthesis of all compounds needed by the cells

A complete diet must supply:

- Carbohydrates (carbs), proteins, and fats
- 18 inorganic elements (minerals)
- 17 vitamins (essential for life)
- Water
CARBS, PROTEINS, LIPIDS

**Carbohydrates**: Supplied as starch, sugar, cellulose (fiber). Starch and sugar are essential.

**Proteins**: Supplied as eggs, milk, soybeans, meats, vegetables, and grains. 8 essential amino acids.

**Fats and lipids**: Animal fats (saturated) and vegetable fats (unsaturated). 3 are essential (linoleic, linolinic, and arachidonic).

<table>
<thead>
<tr>
<th>Energy value</th>
<th>4 Cal/Gm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9 Cal/Gm</td>
</tr>
</tbody>
</table>

NORMAL DAILY INTAKE ~2,500 CAL.
Weight Balance

Ideal Body weight
Balanced weight
Gaining weight
Losing Weight
AMERICAN CANCER SOCIETY
DIETARY GUIDELINES

- Reduce fat intake to 30% of daily calories
- Increase fiber intake to 20-30 g/day
- Eat a variety of vegetables and fruits daily
- Avoid obesity (Increased cancer rates in obese people)
- Consume alcoholic beverages in moderation, if at all
- Minimize consumption of salt-cured, pickled, or smoked foods
## Body Mass Index (BMI)

**Metric Units**

\[ \text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m}^2\text{)}} \]

**U.S. Units**

\[ \text{BMI} = 703 \times \frac{\text{Weight (lb)}}{\text{Height}^2 \text{ (in}^2\text{)}} \]

<table>
<thead>
<tr>
<th>BMI Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &lt; 18.5</td>
<td>Below normal weight</td>
</tr>
<tr>
<td>BMI &gt; 18.5 - &lt; 25</td>
<td>Normal weight</td>
</tr>
<tr>
<td>BMI &gt; 25 - &lt; 30</td>
<td>Overweight</td>
</tr>
<tr>
<td>BMI &gt; 30 - &lt; 35</td>
<td>Class I Obesity</td>
</tr>
<tr>
<td>BMI &gt; 35 - &lt; 40</td>
<td>Class II Obesity</td>
</tr>
<tr>
<td>BMI &gt; 40</td>
<td>Class III Obesity</td>
</tr>
</tbody>
</table>
Cancer Death Rates of Obese Compared to that of Individuals with Normal Body Weight (BMI < 25)

- **Men**
  - 30.0-34.9
  - 35.0-39.9
  - 40 or more

- **Women**
  - 30.0-34.9
  - 35.0-39.9
  - 40 or more

- Cancer death rates for men and women vary across BMI categories with a significant increase for those with a BMI of 40 or more.
Obesity and Cancer
New Findings

• ~30% of adults are obese (BMI > 30)
• ~35% of adults are overweight (BMI 25 - 30)

• **Women**: Uterine cancer x 6
  Kidney cancer x 5

• **Men**: Liver cancer 6-fold
  Colorectal cancer ~1.75-fold
Illnesses Caused by Improper Intake of Nutrients

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Deficiency</th>
<th>Excess</th>
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</thead>
<tbody>
<tr>
<td>Calories</td>
<td>Starvation</td>
<td>Obesity, DM, CVD</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>Low Energy level</td>
<td>Obesity, DM, CVD</td>
</tr>
<tr>
<td>Protein</td>
<td>Kwashiorkor</td>
<td>Ketoacidosis in DM</td>
</tr>
<tr>
<td>Sat. Fat</td>
<td>Low test., vitamin deficiencies</td>
<td>Obesity, CVD</td>
</tr>
<tr>
<td>Trans fat</td>
<td>None</td>
<td>Obesity, CVD</td>
</tr>
<tr>
<td>Unsaturated Fat</td>
<td>Vitamin deficiencies</td>
<td>Obesity, CVD</td>
</tr>
<tr>
<td>Calcium</td>
<td>Osteoporosis, tetany,</td>
<td>Fatigue, depression, kidney stones</td>
</tr>
<tr>
<td>Iron</td>
<td>Anemia</td>
<td>Hemochromatosis, cirrhosis, heart dis.</td>
</tr>
</tbody>
</table>

CVD = CARDIOVASCULAR DISEASE
## Illnesses Caused by Improper Intake of Vitamins

<table>
<thead>
<tr>
<th>Vit. A</th>
<th>Xerophthalmia, night blindness</th>
<th>Cirrhosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vit. B₁</td>
<td>Beri-Beri</td>
<td>?</td>
</tr>
<tr>
<td>Vit. B₂</td>
<td>Skin and corneal lesions</td>
<td>?</td>
</tr>
<tr>
<td>Niacin</td>
<td>Pellagra</td>
<td>Cardiac arrhythmias, birth def.</td>
</tr>
<tr>
<td>Vit. B₁₂</td>
<td>Pernicious anemia</td>
<td>?</td>
</tr>
<tr>
<td>Vit. C</td>
<td>Scurvy</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Vit. D</td>
<td>Rickets</td>
<td>Hypervitaminosis D</td>
</tr>
<tr>
<td>Vit. E</td>
<td>Neurological diseases</td>
<td>Excessive bleeding</td>
</tr>
<tr>
<td>Vit. K</td>
<td>Hemorrhage</td>
<td>Liver damage</td>
</tr>
<tr>
<td>Omega-3 fatty acids</td>
<td>CVD</td>
<td>Bleeding, Stroke, Poor sugar control in DM</td>
</tr>
<tr>
<td>Omega-6 fatty acids</td>
<td>None</td>
<td>CVD, Cancer</td>
</tr>
</tbody>
</table>
DISEASES OF METABOLISM

Metabolism affected

Diabetes mellitus Carbohydrates ➢ Sugar

High cholesterol Lipids ➢ Cholesterol

Gout Proteins ➢ Uric acid
NUTRIENTS, VITAMINS, AND THE LAW
Pharmaceutical Industry and the Consumer

1994 – 2000 - Vitamin bottle labels and nutritional web sites include a phrase saying that their “products and information are not intended to diagnose, cure, or prevent a disease.” It is usually stated that the health claims “have not been evaluated by the FDA.”

The *Dietary and Supplement Health and Education Act* was approved by Congress in October 1994 and updated in January 2000. **It sets forth what can and cannot be said about a pharm product without prior FDA review.**
FDA and the Nutritional Supplements

2000 – FDA: Supplement makers cannot state their products can improve the structure or function of the body or improve common, minor symptoms.

**Allowed statements:** “maintains a healthy heart”, “helps you relax”, ”is good for symptoms of PMS”, “strengthens joint structure”, etc.

Overall, due to this law, vitamin, herbs, and nutrient manufacturers have greater freedom to say what their products can do to improve our health.
More About Vitamins/Nutritional Additives (cont’d)

While this law limits what vitamin manufacturers can claim about preventing or curing diseases, its passage has been a major milestone in the natural health field.

It opens the way for people to obtain the information they need to make the best nutritional choices for themselves.
FOOD STORAGE, PRESERVATION, AND TRANSPORT
Food Preservation Methods

2,000 BC - **Sun drying** ⇒ better taste (?)

600 CE - **Jam** ⇒ boiling the pulp, adding sugar ⇒ spreadable concoction

1,400 CE – **Curing** - Uses salt or sea salt:
- Extracts the water
- Sterilizes the meat
- Salt slows down the oxidation process
Food Preservation (cont’d)

1,758 CE - **Refrigeration** - Benjamin Franklin and John Hadley - Evaporation of highly volatile liquids, such as alcohol and ether lowers the temperature

1,809 CE - **Canning** – Boiling the food and sealing it in closing cans

1,871 CE - **Pasteurization** of milk

1,945 CE - **Vacuum Packing**

2,000+ CE - **Chemical Preservation**
Ceramic Vessel from Mesopotamia
4500 – 4000 BC
Ceramic Amphora 540 – 530 BC
TYPES OF FOOD
Other than regular food

Comfort Food
Fast Food
Junk Food
Natural Food

Organic Food
Slow Food
Whole Food
MADELEINE (French Comfort Food – Marcel Proust’s “In Search of Lost Time”)
British Comfort Food – Sausages and Mash)
Fish and Chips
Lamb Shish Kebab
Universal Comfort Food – Chicken soup (Mothers’ Remedy)
## History of Fast Food

<table>
<thead>
<tr>
<th>Name</th>
<th>Year Founded</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>KFC</td>
<td>1930</td>
<td>North Cotton, KY</td>
</tr>
<tr>
<td>Bob Big Boy’s</td>
<td>1936</td>
<td>Burbank, CA</td>
</tr>
<tr>
<td>Dairy Queen</td>
<td>1940</td>
<td>Joliet, IL</td>
</tr>
<tr>
<td>Carl’s Jr.</td>
<td>1941</td>
<td>Los Angeles, CA</td>
</tr>
<tr>
<td>Baskin-Robbins</td>
<td>1945</td>
<td>Glendale, CA</td>
</tr>
<tr>
<td>Jack in the Box</td>
<td>1951</td>
<td>San Diego, CA</td>
</tr>
<tr>
<td>McDonald’s</td>
<td>1955</td>
<td>Des Plaines, IL</td>
</tr>
</tbody>
</table>
The Classic Trio: Burger, French Fries, and a Soft Dink
SLOW FOOD (Good, clean, and fair)

An International Organization with the aim to promote local foods and traditional gastronomy and food production.

An opposition to fast food, industrial food production, and globalization.

Founded in Italy in 1986. Members in 150 countries.
Slow Food - Restaurant in Santorini, Greece
National Organic Program (USDA)
From Hunting/Gathering to Processed Food and Genetic Engineering

2,000,000 years – Hunting & gathering: Meat, vegetables, roots, fruits, mostly raw

10,000 years – Agriculture: Grains, diary

200+ years – Industrial revolution: Factory farms, canning, pesticides, processed flour, and sugar

50 years – Proliferation of processed foods, fast food, TV dinners, convenience foods

10 years – Genetic engineering, fertilizers, hormones in meats, organic food
From Hunting/Gathering to Processed Food and Genetic Engineering
ALCOHOLIC BEVERAGES
### Fruit and Vegetable Fermentation

Sugar fermentation ⇒ Alcohol

Any fruit or cereal may produce an alcoholic drink

<table>
<thead>
<tr>
<th>Not distilled</th>
<th>Distilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honey ⇒ mead</td>
<td>Potatoes ⇒ vodka</td>
</tr>
<tr>
<td>Barley ⇒ beer</td>
<td>Corn ⇒ bourbon</td>
</tr>
<tr>
<td>Grapes ⇒ wine</td>
<td>Wheat ⇒ whiskey</td>
</tr>
<tr>
<td>Apples ⇒ cider</td>
<td>Agave ⇒ tequila</td>
</tr>
<tr>
<td>Fruits ⇒ liqueurs</td>
<td>Plums ⇒ Slivovitz</td>
</tr>
<tr>
<td>Herbs ⇒ Vermouth</td>
<td></td>
</tr>
</tbody>
</table>
The Alembic

Ancient

Medieval

Modern
WINE
History Of Wine (I)

C. 8000 BC - 6000 BC - First evidence of wine production in Georgia? Or Armenia?
Product of *Vitis vinifera vinifera*, a sturdy plant.
Adopted in the religious ritual, Persia, Greece.
Dionysus, Greek “god of wine”

C. 3000 BC - Phoenicia was the intermediary for wine culture in Egypt
Wine arrived in China through Macedon’s Indo-Greek kingdom
The Areni 1 caves in Armenia
Site of oldest winery
Armenians bringing wine to the Persian Shah
Relief on stone in Persepolis, Iran
History of Wine (II)

2,800 BC - 600 BC – Wine making in Mesopotamia (Epic of Gilgamesh)

2,000 BC - Wine making reached the Greek and Italian peninsulas

1st cent. CE - Roman Empire ⇒ Great business

Western Europe wines are from the Roman source
   Barrels made in the Gaul (today’s France), glass bottles in Syria, clay vessels in Mesopotamia

5th - 8th cent. CE - Barbarian invasions – Christian, Jewish, and Muslim churches preserved winemaking for ritual purposes
Hellenistic mosaic showing Dionysos, the god of wine
Gallo-Roman River Boat with Wine Barrels – 2\textsuperscript{nd} cent. CE
History of Wine (III)

Modern times – European wine cultivated by the Benedictine monks
Dom Perignon, Burgundy, Bordeaux wines in France
Rheingau and Riesling in Germany
Mexico – 16th cent. through the conquistadors, for the Holy Eucharist
16th cent. Wine culture from Europe in California, Argentina, and Chile. Spanish sacramental wine
19th cent. European varieties
1863 - *Phylloxera* louse infested Europe ⇒ 70% destruction of vineyards. American vines were immune ⇒ grafted French vines and saved them.
END OF LECTURE # 3