Discoveries

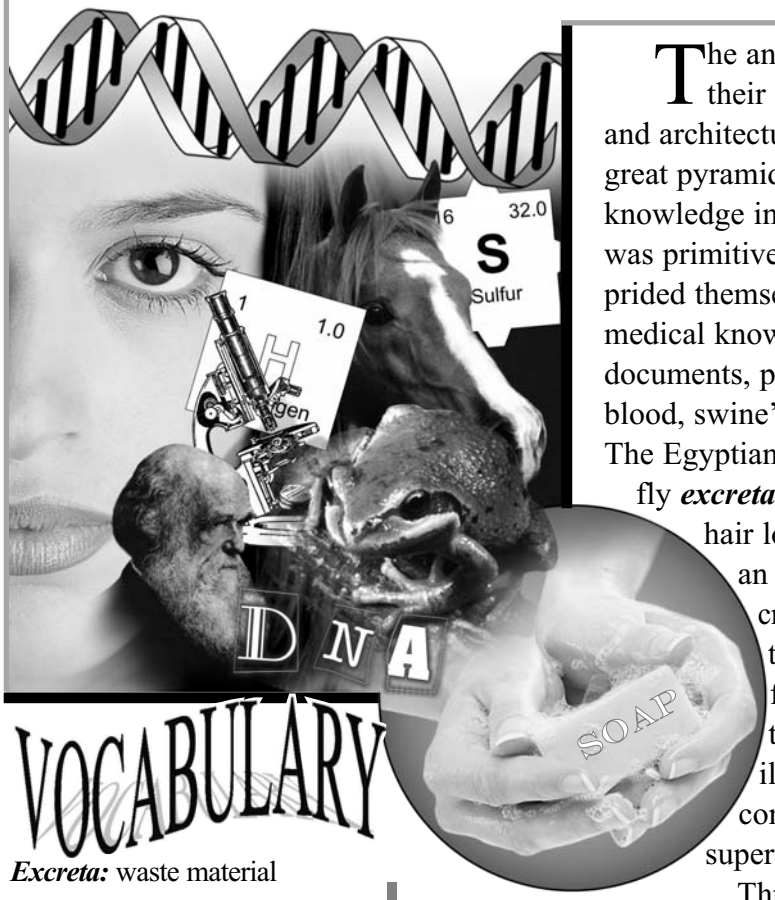
Lesson 3

Chapter 1

Section 1

Lessons 1-5

PUTRID MEAT AND STINKING FAT—EARLY HISTORY OF SCIENCE



The ancient Egyptians were well known for their advanced astronomical knowledge and architectural engineering, as evidenced by the great pyramids. However, the Egyptian level of knowledge in biological and medical practices was primitive and dangerous. Nevertheless, they prided themselves on their presumed great medical knowledge. According to ancient documents, popular prescriptions included lizard's blood, swine's teeth, putrid meat and stinking fat. The Egyptian's remedy for a painful tumor was fly ***excreta*** mixed with sycamore juice. For hair loss, Egyptian doctors recommended an application of fats from a horse, a crocodile, a cat, a snake, or a donkey's tooth crushed in honey. Despite the fact that these "remedies" failed and that many people died of serious illnesses, the Egyptian doctors continued applying these crude, superstitious procedures.

Throughout history, every age had its own set of false ideas and assumptions. We read about the example of when the medical community refused to accept simple hand washing as a mandatory sanitary technique. History records many other examples of what seems foolishness to us in the twenty-first century. For hundreds of years, people believed that the Sun and other planetary bodies revolved around the Earth. This idea was known as the ***geocentric theory*** and was alleged in the 1500s to be false. During the seventeenth and eighteenth centuries, another theory was universally accepted and taught as fact. This theory was

VOCABULARY

Excreta: waste material eliminated from an organism
Geocentric Theory: the theory that the sun and other planetary bodies revolve around the earth
Phlogiston Theory: theory that every substance contains an imagined ingredient, *phlogiston*, which causes combustion
Dark Ages: a period of barbarism and cultural decline from the fall of the Roman Empire (476 A.D.) to about 1000 A.D.
Rigor: strict precision; exactness

known as the ***phlogiston theory***. It supposed that every substance contained an imagined ingredient called *phlogiston*, which allegedly caused matter to burn. Later, the French chemist, Antoine Lavoisier, demonstrated conclusively that *oxygen* was the combustible substance found in all matter.

Many other historical blunders of science could be mentioned. What we need to keep in mind is that scientists are human beings. The assumption that they are completely objective, error-free, impartial, "cold machines" dressed in white coats is, of course, absurd.

Like everyone else, scientists are influenced by prejudice and preconceived ideas. You should also remember that just because most people believe a particular thing does not necessarily make it true. Majorities can be, and often have been, completely wrong. This truth is very important to remember in any study of science.

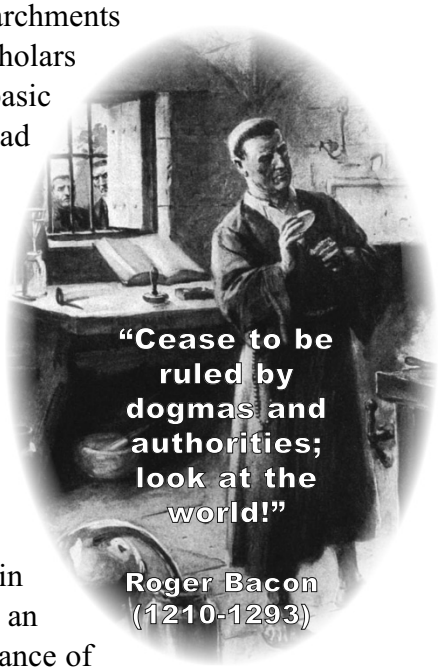
The Rise of Modern Science

The scientific approach discussed in the previous lesson is of relatively recent origin. It may seem obvious to you that the way to learn about nature is to look at it, to seek evidence by observation. However, for many centuries, observation was not the obvious procedure for men and women seeking answers. Even though major scientific discoveries were made in several of the ancient civilizations such as Babylonia and Greece, these early activities were very limited. The world experienced a steady decline in scientific learning a century or so before the birth of Christ. Between about 200 and 1200 A.D., virtually no important discoveries were made, and much of what had been discovered was lost or forgotten during the period of time called the ***Dark Ages***. Instead, superstition reigned along with greater reliance on Roman church dogma. "Scholars" were more likely to haggle over the exact meaning of a sentence in one of Aristotle's books on plants than actually studying the plants themselves. Most ancient scholars never even entertained the idea of conducting experiments, or that revered authorities might have been in error on some assertions.

VOCABULARY

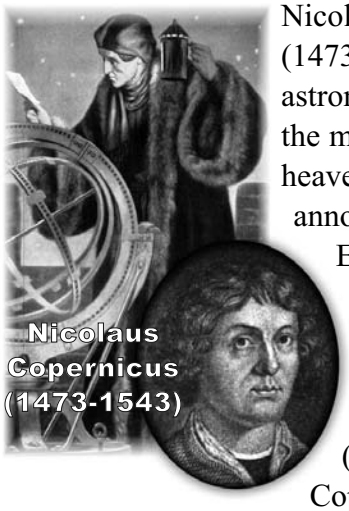
Treatise: (tre·tes) a written exposition or argument including facts, principles and conclusion presented methodically

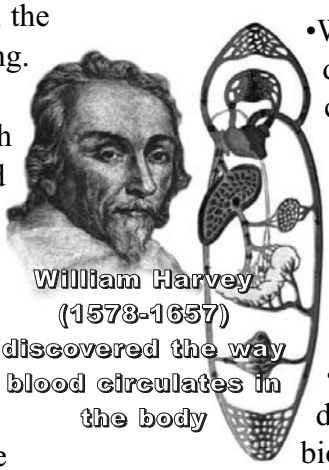
Then came a period of intellectual awakening in Europe. Scientists began studying ancient parchments used by Hebrew scholars who accepted the basic premise that God had established the universe and put certain laws into existence. Therefore, man was merely discovering the laws of God. Roger Bacon (1210-1293), at Oxford University in England, called for an end to blind acceptance of traditional teachings such as those of Aristotle. Bacon said, "Cease to be ruled by dogmas and authorities; look at the world!" Francis Bacon (1561-1626), three centuries later, championed the experimental approach



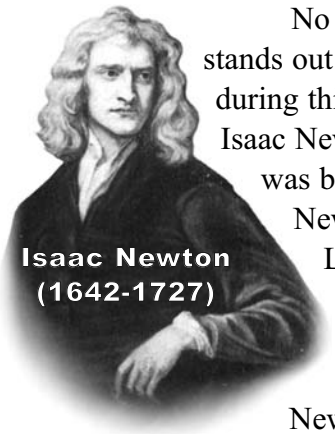
to science, urging all men to trust no statements without verification and to test all things with ***rigor***.

Within the physical sciences, the intellectual climate also was changing. Nicolaus Copernicus (1473-1543), a Polish astronomer, analyzed the movements of heavenly bodies and announced that the Earth moves around the Sun rather than the Sun around the Earth! Galileo Galilei (1564-1642) embraced Copernicus' theory, but was forced to retract his belief under threat of excommunication from the Church of Rome. Despite Galileo's retraction, educated men could no longer be suppressed. They began to question accepted theories and to express new ideas. The knowledge explosion had begun!



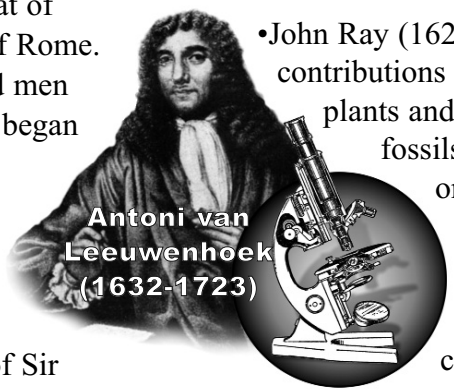


No other name stands out so prominently during this period as that of Sir Isaac Newton (1642-1727), who was born the year Galileo died. Newton's discovery of the Law of Gravitation and the movements of the planets brought physical science into a new era. Newton's mathematical and astrological achievements and scientific laws were based primarily on biblical concepts.



Simultaneously, biological science was advancing at its own rapid pace:

- Andreas Vesalius (1514-1564) described in greater detail than ever before the anatomy of the human body.
- Ulisse Aldrovandi (1522-1605) published three large books on birds and a huge ***treatise*** on insects.
- William Harvey (1578-1657) discovered the way blood circulates in the body.
- Marcello Malpighi (1628-1694) extended Harvey's work and made major contributions to the understanding of the way the embryo develops.
- Robert Hooke (1635-1703) first detected the presence of cells in biological material.
- Antoni van Leeuwenhoek (1632-1723) studied and described many microscopic organisms.



- John Ray (1627-1705) made major contributions to the knowledge of plants and correctly explained fossils as the remains of once-living organisms.
- Carolus Linnaeus (1707-1778) founded the modern system of classifications of living organisms.

Even though the discoveries by these men were important, their work during this time (1600-1700) did not spark the sort of explosive growth of biological science, as did Newton's work in the field of physical science. The explosion of biological science did not begin until 1859 when British naturalist Charles Darwin (1809-1882) introduced his book: *On The Origin of Species by Means of Natural Selection or The Preservation of Favored Races in The Struggle for Life*.

In the next lesson, we will explore the life of Charles Darwin.

LIFE PRINCIPLE

"In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual."

—Galileo Galilei (1564-1642)
Italian scientist and mathematician