

THE FOUR ORGANIC ELEMENTS.
OXYGEN, HYDROGEN, NITROGEN AND CARBON.

IV.—CARBON.

Carbon is the most curious and interesting of all the four elements which we have undertaken to describe. The simple manner in which it passes from the animal to the vegetable kingdom, and from the vegetable back to the animal, has attracted to it as much attention from the physiologist and the geologist as from the chemist. A large portion of our food consists of carbon. When we take our food into our stomachs, a small portion of it is digested, and, after being mixed with a proper quantity of bile, is carried by a duct and poured into one of the great veins leading to the heart. From the heart, the blood is spread through the lungs into vessels which ramify into a very extensive surface of exceedingly thin membrane, on the opposite side of which is atmospheric air. The oxygen of the air passes through this membrane, and enters into combination with the carbon, in other words, burns it; producing that slow fire which warms our bodies. This burning is simply the combination of carbon with oxygen producing carbonic acid, which is always composed of precisely the same proportions of carbon and oxygen, being 6 pounds of carbon to 16 pounds of oxygen. This acid can be solidified in the form of white and intensely cold snow; but it generally exists in the form of gas, which is transparent and invisible.

A portion of the carbonic acid in the atmosphere comes in contact with the leaves of plants, which absorb it, when, by a combined action of light and of the force of vegetable life in a way which is not yet understood, the acid is decomposed into its two elements—oxygen and carbon, the oxygen passing off into the air, and the carbon being carried by the sap to build up the structure of the plant. Carbon is the only one of the four principal organic elements which preserves the solid form when uncombined. If we heat the trunk of a tree or other portion of a plant, it is decomposed, and the oxygen, hydrogen and nitrogen pass off in the form of gas; while the carbon, if it is protected by a covering of turf or by a tight retort from contact with the air, remains in the form of charcoal. If the carbon, while heated, is allowed to come in contact with the air, it combines with the oxygen, forming carbonic acid, when it too assumes the gaseous form and floats away into the atmosphere, ready to be re-absorbed by leaves and to resume its round of change.

The various coal beds of the earth contain abundant evidence that they are formed of the remains of plants. Coal is constantly found, in which the form and structure of the trunk, the branches, the buds, the leaves and the fruit of various trees are perfectly preserved; the flowers alone are wanting, probably because their great delicacy has prevented them from being preserved through the heat and pressure to which the coal has been subjected. Pines, palms and ferns are the three orders of plants of which most of the coal is formed, though numerous species of other genera have been found, and the botany of the coal has become an extensive study. The vegetable matter of which the coal is composed generally grew in great swamps, which, being filled by small plants, were finally covered by forests, when the whole mass, by the changes constantly going on upon the earth's surface, settled down beneath the sea in the same way that the south of Italy is now settling. Shells, sand, lime and other substances were then deposited upon it, forming a rock in the same way that a rock is now being formed along the telegraphic plateau; after which the whole was lifted again above the water, as Chili is now being raised. During these changes, heat and pressure expelled more or less of the volatile portion of the vegetable matter, leaving the carbon and earthy matter or ashes. In anthracite coal a larger portion of the hydrogen and other volatile portions have been expelled than in bituminous coal.

In the beds of rock below the coal, and which, of course, were deposited before, and are older than the coal, there are numerous remains of fishes, but not one single specimen of the remains of any air-breathing animal has ever been found; while the rocks directly above the coal are filled with the remains of air-breathing animals. From these facts the inference has been drawn that, before the coal era, the atmosphere was so charged with carbonic acid that no animal could breathe it, and that this acid was removed by being absorbed by the leaves of trees and converted into coal, when it was stored away in great beds for the use of the present active generation.

HISTORICAL DAYS IN OCTOBER.

[Collated expressly for the Scientific American.]

1. 1676. Bacon, the rebel of Jamestown, died; 1730. Stockton, one of the signers of Independence, born; 1746. Muhlenburg, an American general, born; 1807. Muhlenburg died on his birthday; 1754. Paul, Emperor of Russia, born; 1777. Alexander Sumorokof, founder of the Russian theater, died; 1815. Murat, one of Napoleon's marshals, shot.
2. 1780. Major Andre executed; 1782. General Charles Lee died; 1808. Samuel Adams, one of the signers of the Declaration of Independence, died.
3. No event of interest transpired on this day.
4. 1641. Father Raymbault, a French Jesuit, reached Sault St. Mary; 1777. Battle of Germantown.
5. 1056. Henry III., Emperor of Germany, died; 1318. Edward Bruce defeated at Dundalk, Ireland; 1710. Port Royal taken by the British; 1740. Baratier, a distinguished scholar, died; 1761. Wm. Pitt resigned his power to George III.; 1787. Thomas Stone, one of the signers of the Declaration of Independence, died; 1805. General Cornwallis died; 1809. A levy of 36,000 men raised in France by Napoleon; 1813. Simon Girty, a barbarous tory, killed.
6. 877. Charles II., King of France, poisoned; 1285. Phillip III., King of France, died; 1510. Dr. John Cains, an eminent physician, born; 1781. General Scammel died; 1849. Thirteen Hungarian officers shot by the Austrians.
7. 929. Charles III., King of France, died; 1747. Dickinson, founder of the New Jersey College, died; 1765. Second Colonial Congress held; 1777. Battle of Saratoga.
8. 1726. John Condiac, a child of astonishing learning, died; 1751. Teignmouth born; 1793. John Hancock died; 1805. Treaty on neutrality made by Naples.
9. 1047. Clement II., Pope of Rome, died; 1553. Thuanus, a celebrated French historian, born; 1746. John Brainard, an Indian missionary, died; 1781. First shot thrown into Yorktown; 1812. Two British brigs taken at Fort Erie; 1813. A levy of 280,000 men raised in France; 1854. Opening of the trenches before Sevastopol.
10. 1738. Benjamin West born; 1775. General Gage left America; 1797. Carter Braxton, one of the signers of the Declaration of Independence, died; 1827. Colonel Howard died.
11. 1347. Louis V., Emperor of the West, died; 1614. Charter granted to the Amsterdam Company; 1776. First naval battle fought between Great Britain and America.
12. 1492. Columbus discovered America.
13. 1417. Gregory XII., Pope of Rome, died; 1503. Pius III., Pope of Rome, died; 1759. Captain Joseph Graham died; 1777. British landed at Kingston, N. Y.; 1795. Wm. Prescott, a bloodthirsty Englishman, died; 1803. Battle and fall of Agra, India; 1812. Battle of Queenstown: American loss, 860; British about the same.
14. 1066. Battle of Hastings; 1644. Wm. Penn born; 1705. Stanilaus crowned King of Poland; 1734. Francis Lightfoot Lee, one of the signers of the Declaration of Independence, born; 1806. Battle of Jena; 1806. Battle of Anerstadt; 1809. Peace signed between Austria and France.
15. 1558. Congress of Cambray between the Spaniards and French; 1591. Gregory XIV. died; 1789. Dr. John Morgan died.
16. 29. Christ preached the sermon on the Mount; 1758.

- Noah Webster, author of "Webster's Dictionary," born; 1777. Lorenzo Dow born; 1793. Marie Antoinette, Queen of France, beheaded; 1813. Battle of Leipzig; 1817. Kosciusko died.
17. 707. John VII., Pope of Rome, died; 1346. Battle of Durham; 1683. The people of New York exercise legislative power; 1777. Burgoyne surrendered; 1781. Cornwallis surrendered; 1797. Peace of Campo Formio; 1842. Fremont returned from his first exploration; 1854. Opening of the fire against Sevastopol.
 18. 1806. Saxony overcome by the French; 1812. The British vessel *Frolic* captured: British loss, 100.
 19. 1216. John I., King of England, died; 1665. Sir Thomas Browne born; 1682. He died on his birthday; 1745. Jonathan Swift died; 1809. The walls of Vienna blown up by Napoleon; 1814. Mercy, wife of James Warren, died.
 20. 1422. Charles VI., King of France, died; 1632. Sir Christopher Wren born; 1722. Leopold, Duke of Brunswick, born; 1780. Champe deserted to take Arnold; 1805. Ulm surrendered to Napoleon; 1827. Battle of Navarino.
 21. 1681. Edward Quincy born; 1754. Williams, one of the capturers of Andre, born; 1774. John Bradstreet died; 1805. Admiral Nelson killed; 1805. Battle of Trafalgar.
 22. 1555. Charles V. conferred on his own son, Philip II., the Grand-mastership of the Golden Fleece of Burgundy; 1642. Raymbault, a French discoverer, died; 1705. Sir Cloudsley Shovel died; 1775. Randolph Peyton, one of the delegates of the first Continental Congress, died; 1777. Fort Mercer attacked by the Hessians.
 23. 1739. England declared war against Spain; 1750. Thomas Pinckney born; 1777. Americans attacked at Fort Mifflin.
 24. 1415. Battle of Agincourt; 1760. George II., King of England, died; 1812. Combat of the Carion, Spain; 1852. Daniel Webster died.
 25. 1154. Stephen, King of England, died; 1400. Chaucer died; 1555. Charles V. abdicated his throne to Philip II.; 1760. George III. ascended the English throne; 1764. Hogarth, a distinguished painter, died; 1854. Battle of Balaklava.
 26. 1751. Dr. Doddridge, an eminent divine, died; 1812. Napoleon commenced his retreat from Moscow; 1850. North-west passage discovered.
 27. 1439. Albert II., Emperor of Germany, died; 1492. Cuba discovered; 1682. William Penn arrived in America; 1776. The American brigantine *Hampden* wrecked; 1807. Treaty between Napoleon and the King of Spain; 1823. Zephariah Swift, Chief Justice of Connecticut, died.
 28. 900. Alfred the Great died; 1467. Erasmus born; 1704. Locke died; 1776. Battle of White Plains; 1810. Lieut. Colonel Edward Carrington died.
 29. 1562. George Albot, Archbishop of Canterbury, born; 1591. Pope Innocent IX. died; 1618. Sir Walter Raleigh beheaded; 1727. Earthquake in New England; 1808. Napoleon left Paris for Spain; 1842. Allan Cunningham died, aged 56.
 30. 1753. John Adams born; 1813. Battle of Hanau; 1840. Destructive earthquake at Zante.
 31. 1448. John VII., Emperor of Constantinople, died; 1674. Dutch rule abolished in America; 1687. The charter of Connecticut hidden in the oak; 1733. The Moravians commenced their voyage to Georgia; 1740. William Paca, one of the signers of the Declaration of Independence, born; 1803. United States frigate *Philadelphia* lost near Tripoli, 1808. Combat of Durango, Spain.