Mother of Pearl.

Mother-of-pearl is the hard, silvery, internal layer of several kinds of shells, especially oysters, the large varieties of which in the Indian Seas secrete this coat of sufficient thickness to render the shell an object of manufacture. The genus of shell-fish, *Pentadinæ*, furnishes the finest pearls as well as mother-of-pearl: it is found round the coasts of Ceylon, near Ormus, in the Persian Gulf, at Cape Comorin, and in some of the Australian seas. The dealers in pearl-shells consider the Chinese from Manilla to be the best; they are fine, large, and very brilliant, with yellow edges. Fine large shells of a dead white are supplied by Singapore. Common varieties come from Bombay and Valparaiso, from the latter place with jet black edges.—South Sea pearl-shells are common, with white edges. The beautiful dark green pearl-shells called ear-shells or sea-ears, are more concave than the others, and have small holes round the margin; they are the coverings of the Haliotis, which occurs in the Californian, South African, and East Indian Seas.

In the Indian collection of the Great Exhibition, specimens of the finest pearl shells were shown, such as the Meleagrina margaritifera, Haliotis gigas, Haliotis iris, and a large species of Turbo, which shells are known in commerce as flat-shells, green snail-shells, buffalo-shells, Bombay shells. Messrs. Fauntleroy and Mr. Banks had also some fine collections. The latter gentleman states that the shore of the Sooloo Islands affords the finest shells.

The beautiful tints of the mother-of-pearl depend upon its structure; the surface being covered with a multitude of minute grooves, which decompose the reflected light. Sir David Brewster, who was the first to explain these chromatic effects, discovered, on examining the surface of mother-of-pearl with a microscope, "a groved structure, like the delicate texture of the skin at the top of an infant's finger, or like the section of the annual growths of wood as seen upon a dressed plank of fir. These may sometimes be seen by the naked eye; but they are often so minute that 3,000 of them are contained in an inch." It is remarkable that these iridescent hues can be communicated to other surfaces as a seal imparts its impress to wax. The colors may be best seen by taking an impression of the mother-of-pearl in black wax; but "a solution of gum arabic or isinglass, when allowed to indurate upon a surface of mother-of-pearl, takes a most perfect impression from it, and exhibits all the communicable colors in the finest manner, when seen either by reflection or transmission. By placing the isinglass between two finely-polished surfaces of mother-of-pearl, we obtain a film of artificial mother-of-pearl, which, when seen by single lights, such as that of a candle, or by an aperture in the window, will shine with the brightest hues."

It is in consequence of this lamellar structure that pearl shells admit of being split into laminæ for the handles of knives, for counters, and for inlaying. Splitting, however, is liable to spoil the shell, and is therefore avoided as much as possible. The different parts of the shell are selected as nearly as possible to suit the required purposes, and the excess of thickness is got rid of at the grindstone. In preparing the rough pearl-shell, the square and angular pieces are cut out with the ordinary brass-back saw, and the circular pieces, such as those for buttons, with the annular or crown-saw, fixed upon a lathe-mandrel. The pieces are next ground flat upon a wet grindstone, the edge of which is turned with a number of grooves, the ridges of which are less liable to be clogged than the entire surface, and hence grind more quickly. If the stone be wetted with soap and water it is less liable to be clogged. The pieces are finished on the flat side of the stone, and are then ready for inlaying, engraving, polishing, &c. Cylindrical pieces are cut out of the thick part of the shell, near the hinge, and are rounded on the grindstone preparatory to being turned in the lathe. The finishing and polishing are described in the third volume of Mr. Holtzapffel's excellent work on "Mechanical Manipulation." Counters, silk-winders, &c., are smoothed with Trent sand or pumice-stone and water on a buff-wheel or hand-polisher, and are finished with rotten-stone moistened with sulphuric acid, which developes finely the striated structure of the shell. For inlaid works the surface is made flat by filing and scraping; then pumice stone is used, and after this putty-powder, both on buff-sticks with water; and the final polish is given with rotten stone and sulphuric acid, unless tortoise-shell or some other substance liable to be injuriously affected by the acid be present in the inlay. In turned works fine emery paper, rotten stone and acid or oil are used. The pearl handles for razors are slightly riveted together in pairs, then scraped, sand-buffed on the wheel with Trent sand and water; thirdly, gloss-buffed on the wheel with rotten stone and oil, or sometimes with dry chalk rubbed on the same wheel; and fourthly, they are handed up, or polished with dry rotten stone.

Chemistry of Life and Alcohol.

Not long since Prof. Youmans, author of the "Chart of Chemistry," delivered a lecture in Brooklyn, on the subject set forth by the caption of this article. We intended to present a clear and brief abstract of it before this to our readers, but have not been able till now. It is a subject of great interest to every person, but strange to tell, although every person knows what alcohol is, and the various objects for which it is used, very few have a sound knowledge of its nature. The following remarks of Prof. Y. no doubt present much that is new to many persons:—

"The accomplishment of great objects by the simplest means is the standing marvel of the universe. The chief mass of all the living beings upon the globe, vegetable and animal, is made up of but four kinds of matter—four elementary substances—Carbon, Oxygen, Hydrogen, and Nitrogen. All the phenomena of life upon our planet and the appearance and disappearance of the living race—and all the changes to which they are liable depend mainly upon the properties of these four simple bodies.

These combine, taking the three forms of carbonic acid, water and ammonia, and in this state enter the plant, and are converted by it into living matter. The great office of vegetation is to convert mineral into organized substances—to impart to dead elements the property of life or vitality. It is the builder, the architect of all organization, and the great characteristic vegetable changes go forward in the leaf. The forces which produce these wonderful transmutations are solar radiations, agents which flow in all directions from the central star of our planetary system, striking upon half the globe at once, which turns incessantly to expose all parts to their action. These take effect upon the vegetable leaf. The sun has a relationship of control not only over orbs, but over atoms. Its beams possess a three-fold power—an illuminating, a heating, and a chemical power. These forces rule the ultimate atoms, decomposing carbonic acid, water, and ammonia in the leaf and regrouping their atoms into living or organized compounds. The sun is thus the perpetual creator of life upon this planet. It is the great foundation and source of those constructive powers of which the terrestrial vegetable kingdom is the theatre and effect. It affords the motive power of plants.

But other things take place upon this globe beside the building up of organization. There is also decay and dissolution. The sunbeam has its antagonist, and that antagonist is the oxygen of the air. This decomposes and destroys all organized substances, by active combustion or by slow decay. It is the great destructive agent—the enemy of all organization and life. It is continually rending organic compounds asunder, and carrying back the elements from the living to the dead world.

Now, as force was required to place these atoms in the organized condition, this force is given out again when the atoms return to the mineral state. Organized compounds are seats of force, by virtue of the arrangements of their atoms—they yield up the force when the atoms pass to the inorganic condition.—

Thus, in burning wood under a steam boiler, its atoms relapse into the condition of carbonic acid and water, giving out, in the shape of heat, the power which was lodged in the organized wood, and which the machine makes mechanically available. All organized substances—all matter that has been put together in the plant, is capable of returning again to the mineral state, by combustion with the production of force.

All parts of animal bodies are organized but animals possess no power of forming their own organized compounds. The animal cannot consume the dead mineral earth, water and air, and convert them into nerve, muscle, and tissue. The materials for nerve, muscle, and tissue, originate in plants. They are formed alone in vegetable structures. Now, of the innumerable organized products of vegetable growth, foods are those few substances, which are so prepared by the hand of Nature, that they may be taken into the animal system, become a part of it, and then gradually return to the mineral state, and thus give forth their force in the form of animal power. They must be capable of becoming part of the animal organization, and then of gradually perishing out of it in that regulated, measured, normal way, which we understand by the term "health." The agent which effects these animal decompositions and destructions, is oxygen gas of the respired air. It destroys food in the body for the production of mechanical force; or a metal in a galvanic battery for the production of electrical or magnetic force. The composition of foods, therefore, and their attraction for oxygen, must be exactly adapted to the normal condition, powers, and purposes of the animal being.

But the same agent, atmospheric oxygen, through the process of slow decay, is continually carrying back all kinds of organized matter to the mineral world. It is carried back by various routes, and by many intermediate steps, but always tends finally (except the ashes) to pass into the condition of carbonic acid, water and ammonia. These numerous routes and intermediate steps are the countless compounds that are formed in varying circumstances by the decomposing, decaying body. Wood, when decaying under various conditions resolves itself into diverse products, and so of all other organic compounds. Again, when organic matter, containing nitrogen, as blood, meat, cheese, bread, or milk, begins to putrify and perish, if it is added to a solution of sugar in water, the sugar takes on the same rotting condition, is destroyed, its elements regroup themselves into new compounds, the products of dissolution. One of these products is carbonic acid gas—a universal result of all combustion and decay—a subtle and deadly poison to all animals. Nearly one-half the sugar takes this form, and thus leaps back at one movement, to the mineral condition from which it came. The other product of this destructive change, and twin brother of carbonic acid, coming into being at the same moment and from the same source is "Alcohol." Alcohol is thus seen not to be a product of vegetable growth, its origin is not the same as the alimentary principles of food. The life creating sunbeam, "the finger of God stretched across the universe," never took atoms from the mineral world, and arranged them into alcohol. We get it only by the destruction of natural food, of wholesome aliment. It commences only when death begins. Alcohol, it is true, contains the same elements as sugar, but that does not prove that it is therefore at all similar in properties, or possesses the same relationship to the mi-ral system. All organized compounds consist mainly of the same three or four elements, but we do not hence conclude that they have all identical properties. The atmosphere consists of the same elements as aquafortis, but while the former is the vital sustainer of all life, the other is rank poison to it. The argument thus far against the adaptation of alcohol to the purposes of food is only presumptive. It is found in bad company, it has a suspicious origin, and if it is entitled to a place and rank among the proper aliments of man, it came not in the appointed manner, but "has climbed up some other way." We must not here prejudge the question of its adaptation to alimentary purposes. Science forbids us to reason in advance of actual observation and experiment. It may only be stated now that in chemical composition and properties, and its relation to oxygen and the combustive process, alcohol differs widely from the substance whence it was derived, and from all normal alimentary compound."

[In connection with this, we would add that carbonic acid gas is only a poison by inhaling it into the lungs. It is the gas expelled from the lungs which for the low combustion going on in our frames, requires the inhalation of oxygen. Mechanically speaking, the inhalation of carbonic acid instead of oxygen, has the same effect, as two opposing forces meeting—they destroy one another. We must guard against extreme views on this as on other scientific subjects, and Prof. Youmans exhibits the right spirit in this respect. If we proceed upon what are called by some "natural principles," no bachelor should boil his potatoes, and no good housewife bake her snow white loaf of flour bread.

Survey of California.

The government survey of California is being actively carried on after many difficulties from want of funds to meet the unavoidable expenses, the officials being divided into parties who take certain branches of the service.

The Astronomical and Magnetic party undertook the determination of the prominent headlands and harbors on the coast, and especially those where lighthouses had been ordered by Congress. In connection with this party is a topographical party for the execution of the topography of the country adjacent to the stations occupied. The plan of operations embraced the determination of the longitude and latitude of those primary stations, and the connection with them of secondary points and harbors by means of chronometers, &c. The magnetic declination and magnetic elements generally were to be determined, and whenever practicable tidal observations to be made. In pursuance of this plan, eight primary and thirteen secondary stations have been occupied, between San Diego and Admiralty Inlet, and the topography of the primary ones executed.

The Triangulation party commenced its labors in San Francisco Bay, executed that of San Diego and Monterey Bays, and the Columbia River toward Cathlamet, and upon the return of the assistant in charge to the States, the chief of the astronomical party commenced the triangulation of the Santa Barbara channel—but the badness of the rainy season rendered it impolitic to prosecute it. The number of stations occupied in the execution of the triangulation has been very great.

The Topographical parties have finished San Diego and False Bays, part of Monterey Bay, the approaches, entrance, and part of San Francisco Bay, and are still at work on it, giving shore line and points to the hydrographic party.

The Hydrographic party commenced operations by a preliminary survey of Humboldt Bay. Then followed the reconnoissance of the coast from Punta de Los Reyes to the Mexican Boundary, and in order to render this as complete as such a work can be, afterward combined with the astronomical party for the more accurate determination of the longitude and latitude of the harbors of the mainland and the Islands of the Sta. Barbara Channel. For this purpose two expeditions were made with twenty chronometers. The reconnoissance map has not yet been published, though it has been over a year at Washington, and much disappointment is expressed by those interested in our steamships and coasting trade at its non-appearance. All the harbors on the lower coast have been surveyed and sounded out and sailing directions given; most of them have been published. The next work undertaken was the reconnoissance of the Coast from Columbia River to the entrance of Admiralty Inlet, and upon its completion Shoalwater Bay and the bar and entrance of Columbia River as high as Astoria, were surveyed and sounded, and the sailing directions given. The operations of this party cannot be carried on "outside" in winter, and it is now engaged in the sounding of San Francisco Bay and keeping up tidal observations.

A colossal statue, in bronze, of the great composer, Beethoven, is making at Florence to occupy the niche in the New Music Hall, at Boston.