The fountain of scintillating sparks and drops of melted steel—which, descending in a broad sheet some fifteen feet in hight, poured upon the stage and rolled in a torrent of fiery hail toward the foot lights—was a sight never to be forgotten. A wheel five feet in diameter, supporting electrical tubes, was rotated, while flashes of electric fire from the largest induction coil in the world, belonging to the University of Pennsylvania, were passed through, producing a dazzling star of constantly changing colored rays.

"The drop curtain, descending for a few moments, rose again, displaying a beautiful palace scene, illuminated by numerous lime lights, judiciously placed. There then marched in a great number of masked figures, in costumes representing the colors of the rainbow, and bearing banners with brilliant devices. These taking positions, formed a tableau equal in brilliancy and beauty of general effect to anything we have ever seen upon the stage. At a signal the white light was extinguished and its place supplied by pure yellow light, equally bright, when every trace of color disappeared, and the entire phalanx became a ghastly company of spectres bearing banners of white and black. The means for producing this yellow light is a device of Professor Morton's, entirely new and eminently efficient—in fact, the entire house was illuminated with it from the stage, so that the same wonderful change was manifest in the faces and costumes of the audience."

Vegetable Hairs.

Among the many objects of interest which the vegetable kingdom offers to the microscopist, one of the most varied and the most universally distributed is to be found in what are called hairs, which clothe the surface of the leaves and flowers of a vast number of plants and trees. These hairs are appendages of, and arising from, the skin or epidermis; and although their simplest form is that of a single projecting and elongated cell, they are more generally composed of a series of cells, often bearing at the extremity a glandular protuberance containing the essential oil of the plant; and the variety of shapes which they assume appears to be almost unlimited, while the characteristics of many of them are so definitely marked, that, in the vast majority of cases, it would be quite possible to determine, if not the actual species, at least the order or family to which any specimen belonged, from the observation of a single hair. The hair of the hop-plant, for instance, is so unlike most other vegetable hairs, that it would be impossible to mistake it.

The leaves and flowers of some plants possess two or three varieties of hairs, often in close proximity to each other. The flower of the snapdragon has single celled hairs, some terminating in a globular gland, others in a cone-shaped gland. The garden verbena has some hairs like a flattened rosette on the top of a tall stalk, and others breaking out on all sides of their entire length in curiously knotted excrescences. The hair of the marigold consists of a double layer of elongated cells, built up one upon another, and lying closely side by side. The base of the hair of the common stinging-nettle contains an irritating secretion, which flows through the straight tubular elongation until it reaches the little bulb-like swelling at the extremity of the hair. This is easily broken off when touched by any object, and the acrid fluid then escapes, and produces the well known sting.

Some hairs are forked or branched, like those of the dandelion and the plane tree; others consist of a single elongated cell, like that of the cabbage. In the hair of the marvel of Peru the elongation is formed by a chain of cells placed end to end, and connected by slender threads. In the thistle and the groundsel, the last cell of the hair is lengthened out to a bristle-like extremity. On the leaves of some geraniums may be found two kinds of hairs, the one formed of a series of three elongated cells, the other a flattened disk-like form terminating a short stem of three or four cells. The branched hairs of the lavender are also intermingled with others terminating in a glandular appendage which contains the essential oil that gives to this plant its peculiar odor. On the petal of the heartsease may be found three varieties of hairs. The hairs or spires of some of the cactus tribe are like a series of spear heads placed one upon another. The southernwood hair is composed of a chain of cells, of which the three lower form the stem of the hair while the two upper are lengthened into lateral branches. The leaves of chrysanthemum and the wallflower also bear T-shaped hairs, the former springing from a series of cells that decrease in size from the root to the extremity. The hair of the tobacco plant has a two-celled gland at the extremity, containing the narcotic secretion. The hair of the lobelia is like a knotted club; others assume a star-like appearance, like those of the hollyhock and the ivy. In the geum we have another example of a club-shaped two-celled hair; while that of the bean has a crook-shaped appearance. The flower of the dead-nettle bears two-celled hairs, remarkable for the number of knobs scattered over the surface; a similar appearance is presented by the hairs of the wallflower and chrysanthemum.

Many connecting links present themselves between hairs and scales, such as the stellate hairs of the *Deutzia scabra*, which a good deal resemble those within the air-chambers of the yellow water lily. The cuticle of the iceplant is covered with hairs that have the appearance of frozen dewdrops, and consist of very large oval-shaped cells, which lie detached from one another upon the surface of the cuticle.

As we have probably said enough to draw the attention of young microscopists to this interesting branch of research, we need only add that vegetable hairs are easily preserved in weak spirit, while some retain their natural appearance very fairly in Canada Balsam.—*Hardwicke's Science Gossip.*

As an experiment, several streets in the city of Edinburgh are being illuminated at night by means of the lime light.

Science Familiarly Illustrated.

Glass---Its Material and Manufacture.

A great number of earths, and other mineral bodies, after being fused, do not resume their original character, upon cooling, but pass into a dense, hard, shining, and brittle state, having the character of glass; and are thus said to be vitrified. Most of these substances do not immediately become hard, upon the reduction of their temperature, but go through an intermediate, or ductile, state, in which a combination of of softness with tenacity, enables them to be wrought into articles of use and ornament. Of these, common glass is the most important, while enamels, artificial gems, etc., belong to the same species of manufacture.

Glass is a compound substance, artificially produced, by the combination of silicious earth with alkalies, and, in some cases, with other metallic oxides. These substances, being melted together at a high temperature, unite, lose their opacity, and are fused into a homogeneous mass, which, on cooling, has the properties of hardness, transparency, and brittleness.

The most important ingredient, and, in fact, the basis, of transparent glass, is silica, or oxide of silicium. This earth, nearly in a state of purity, is found in the sand of certain situations, and also in common flint, and quartz pebbles. Sand has the advantage of being already in a state of minute division, not requiring to be pulverized. Pure silicious sand, proper for the glass furnace, is found in many localities. A great portion of that used in the United States is taken from the banks of the Delaware. When flints, or quartz, are employed, they must be first reduced to powder, which is done by heating them red hot, and plunging them in cold water. This causes them to whiten and fall to pieces; after which, they are ground and sifted, before they are ready for the furnace.

An alkaline substance, either potash or soda, is the second ingredient in glass. For the finer kinds of glass, pure pearlash is used, or soda, procured by decomposing sea salt; but, for the inferior sorts, impure alkalies, and even wood ashes, are made to answer the purpose. Lime is often employed, in small quantities; also borax, a salt which facilitates the fusion of the silica.

Instead of the common alkalies, the sulphate of soda may be employed in glass making. But, in this case, it is necessary to liberate the alkali by decomposing the sulphuric acid of the salt. This may be done by charcoal, or, in flint glass, by metallic lead. Lime is also used with this salt.

Of the metallic oxides, which are added in different cases, the deutoxide of lead (red lead) is the most common. This substance renders flint glass more fusible, heavy, and tough, and more easy to be ground and cut. At the same time, it imparts to it a greater brilliancy, and refractive power. Black oxide of manganese, in small quantities, has the effect of cleansing the glass, or of rendering it more colorless and transparent. This effect it seems to produce by imparting oxygen to the carbonaceous impurities, thus forming with them carbonic acid, which subsequently escapes. Common niter produces a similar effect. If too much manganese be added, it communicates a purple tinge to the glass, which, however, may be destroyed by a little charcoal or wood. Arsenious acid (white arsenic) in small quantities, promotes the clearness of glass; but, if too much be used, it communicates a milky whiteness. Its use, in drinking vessels, is not free from danger, when the glass contains so much alkali as to render any part of it soluble in acids.

Glass is of various kinds, which are named, not only from the character of their ingredients, but from the mode in which they are wrought. The name of crown glass is given to the best kind of window glass, that which is hardest, and most free from color. It is made almost entirely of sand and alkali, and a little lime, without lead, or any other metallic oxide, except a minute quantity of manganese, and sometimes of cobalt, which are added to counteract the effect of any impurities, in giving color to the glass. Crown glass requires a greater heat to melt its ingredients, than those kinds which contain a larger quantity of metallic oxide, especially of lead.

After the materials have been intimately mixed, they are subjected to the operation called fritting. This consists in exposing them to a dull, red heat, which is not sufficient to produce their fusion. The use of this process is to drive off the carbonic acid, and other gaseous and volatile matters, which would otherwise prove troublesome, by causing the materials to swell up in the glass pots. The heat is gradually increased, and the materials constantly stirred for some hours until they unite into a soft, adhesive mass; the alkali having gradually combined with the silicious earth. The reason why the fritting is conducted at a low heat is that, if a high temperature were applied at once, the alkali would be driven off, before it had time to combine with the silica.

The homogeneous mass, or frit, is next transferred to the glass pots of the melting furnace. These are crucibles, made of the most refractory clays and sand. A quantity of old glass is commonly placed upon the top of the frit, and the heat of the furnace is raised to its greatest hight, at which state it is continued for thirty or forty hours. During this time the materials become perfectly united, and form a transparent, uniform mass, free from specks and bubbles. The whole is then suffered to cool a little by slackening the heat of the furnace until it acquires sufficient tenacity to be wrought.

The formation of window glass is effected by blowing the melted matter, or metal, as it is called, into hollow spheres, which are afterward made to expand into circular sheets. The workman is provided with a long, iron tube, one end of which he thrusts into the melted glass, turning it round until a certain quantity, sufficient for the purpose, is gathered or adheres to the extremity. The tube is then withdrawn from the furnace, the lump of glass which adheres is rolled upon a smooth iron table, and the workman blows strongly with his mouth through the tube. The glass, in consequence of its ductility, is gradually inflated like a bladder, and is prevented from falling off by a rotary motion constantly communicated to the tube. The inflation is assisted by the heat, which causes the air and moisture of the breath to expand with great power. Whenever the glass becomes so stiff, from cooling, as to render the inflation difficult, it is again held over the fire to soften it, and the blowing is repeated, until the globe is expanded to the requisite thinness. It is then received by another workman upon an iron rod, while the blowing iron is detached. It is now opened at its extremity, and, by means of the centrifugal force, acquired from its rapid whirling, it spreads into a smooth, uniform sheet of equal thickness throughout, excepting a prominence at the center where the iron rod was attached.

After the glass has received the shape which it is to retain, it is transferred to a hot chamber, or annealing furnace, in which its temperature is gradually reduced, until it becomes cold. This process is indispensable to the durability of glass; for, if it is cooled too suddenly, it becomes extremely brittle, and flies to pieces upon the slightest touch of any hard substance. This effect is shown in the substances called Rupert's drops, which are made by suddenly cooling drops of green glass by letting them fall into cold water These drops fly to pieces with an explosion whenever their smaller extremity is broken off. The Bologna phials, and some other vessels of unannealed glass, break into a thousand pieces if a flint, or other hard and angular substance is dropped into them. This phenomenon seems to depend upon some permanent and strong inequality of pressure; for when these drops are heated so red as so be soft, and left to cool gradually, the property of bursting is lost, and the specific gravity of the drop is increased.

Broad glass is a coarser kind of window glass, and is made from sand, with kelp and soap boilers' waste. It is blown into hollow cones, about a foot in diameter, and these, while hot, are touched on one side with a cold iron, dipped in water. This produces a crack, which runs through the length of the cone, nearly in a right line. The glass then expands into a sheet, in its form resembling somewhat the shape of a fan. This appears to have been one of the oldest methods of manufacturing glass.

Flint glass, so called from its having been originally made of pulverized flints, differs from window glass in containing a large quantity of the red oxide of lead. The proportions of its materials differ; but, in round numbers, it consists of about three parts of fine sand, two of red lead, and one of pearlash, with small quantities of niter, arsenic, and manganese. It fuses at a lower temperature than crown glass, has a beautiful transparency, a great refractive power, and a comparative softness which enables it to be cut and polished with ease. On this account it is much used for glass vessels of every description, as especially those which are intended to be ornamented by cutting. It is also employed for lenses and other optical glasses. Flint glass is worked by blowing, molding, pressing, and grinding. Articles of complex form, such as lamps and wine glasses, are formed in pieces, which are afterward joined by simple contact, while the glass is hot. It appears that the red lead used in the manufacture of flint glass gives up a part of its oxygen and passes to the state of a protoxide.

Common green glass, of which bottles are made, is the cheapest kind, and formed of the most ordinary materials. It is composed of sand, with lime, and sometimes clay, and alkaline ashes of any kind, such as kelp, barilla, or even wood ashes. The green color is owing to the impurities in the ashes, but chiefly to oxide of iron. This glass is hard, strong, and well vitrified. It is less subject to corrosion by strong acids than flint glass, and is superior to any cheap material for the purposes to which it is ordinarily applied.

The plates of crown glass which are obtained in the common manner, by blowing them in circular plates, afford the common material for window glass, being cut into squares by first marking the surface deeply with a diamond and then breaking the glass in the same directions, the crack always following the exact course of the incision made by the diamond. But there is always a loss or waste in cutting squares from a circular plate, besides which they can never be very large, owing to the protuberance, or *bull's eye*, which fills the center of the plate, so that a square can never be larger than can be described within less than half the circle. To remedy this disadvantage, plates for looking glasses, and others of large size, are executed in a different way, either by blowing them in cylinders or by casting them in plates at first.

Cylinder glass is blown at first in spheres, like window glass. These are elongated into spheroids by a swinging motion which the workman gives to his rod. The ends of this spheroid are successively perforated, thus converting it into an irregular cylinder. One side of this cylinder is cut through with shears, and the glass is laid upon a flat surface, where it expands into a uniform plate, without any protuberance. It is then annealed, by diminishing the heat, in the common way. When the plates are intended for looking glasses, the finest materials are used, and the heat kept at its greatest hight for a long time, to dissipate all impurities and remove any specks or bubbles.

Looking-glass plates may be blown in cylinders, when they do not exceed about four feet in length. But they cannot well be blown of a larger size than this, from such a quantity of glass as the rod will take up, without becoming too thin to bear polishing. Plates, however, may be made of more than double this size by another process, which is called *casting*, the only mode by which very large plates are produced.

When glass is to be cast it is melted in great quantities, in large pots or reservoirs, until it is in a state of perfect fusion, in which state it is kept for a long time. It is then drawn out by means of iron cisterns of considerable size, which are lowered into the furnace, filled, and raised out by machinery. The glass is poured out from these cisterns upon tables of polished copper, of a large size, having a rim elevated as high as the intended thickness of the plate. In order to spread it perfectly, and to make the two surfaces parallel, a heavy roller of polished copper, weighing five hundred pounds or more, is rolled over the plate, resting upon the rim at the edges. The glass, which is beginning to grow stiff, is pressed down and spread equally, the excess being driven before the roller till it falls off at the extremity of the table. The plate is then ready to be annealed.

As the plates which are cast for looking-glasses are always uneven and dull at their surface, it is necessary to grind and polish them before they are fit for use. The process employed for producing a perfectly even and smooth surface is very similar to that employed in polishing marble, except that the glass, being the harder substance, requires more labor and nicety in the operation. The plate to be polished is first cemented to a table of wood or stone, with plaster of Paris. A quantity of wet sand or emery is spread upon it, and another glass plate, similarly cemented to another wooden surface, is brought in contact with it. The two plates are then rubbed together until the surfaces have become mutually smooth and plane. The emery which is first used is succeeded by emery of a finer grain, and the last polish is given by colcothar or putty. When one surface has become perfectly polished the cement is removed, the plate turned, and the opposite side polished in the same manner.

As the grinding of glass causes an expenditure of a considerable portion of its substance, a great waste of glass takes place when foreign materials are employed in the manner which has been described. To prevent this loss a more economical mode has been introduced, in which the glass is ground with pure flint, reduced to powder. The mixture of glass and flint which is left after the operation is valuable for forming fresh glass.

A variety of ornamental forms are produced upon the surface of glass vessels by impressions given to them with a metallic mold while the glass is in a hot state. Flint glass is the kind which is used for articles intended to possess much brilliancy, but coarser kinds, even of colored glass, are also subjected to the same process. The simplest manner in which the operation is conducted consists in blowing the glass into the mold till it receives the impression on its outside. For this purpose a quantity of glass sufficient to form the intended vessel is taken up on the end of a pipe and inserted at the top of the mold. The workman then blows with his mouth till a hollow portion of glass is driven into the mold, and expands so as to fill every part, and receive an impression on its outside. The mold is usually made of copper, with the figure cut on its inside, and opens with hinges, to permit the glass to be inserted and taken out. As the mold is of necessity much colder than the glass, the latter substance is chilled at its surface as soon as it comes in contact with the copper; hence its ductility is impaired, and the impression given is never so sharp as that which is obtained with substances which are nearly at the same temperatures. Molded bottles, vials, decanters, etc., are made in this way.

An improvement has been made in the process of molding glass, by subjecting the material to pressure, on the inside and outside at the same time, by different parts of a mold, which are brought suddenly together by mechanical power. This process has been carried to great perfection in several of the manufactories in this country, and produces specimens which compare with cut glass in the accuracy and beauty of the workmanship. It is applied only to solid articles, and to vessels which are not contracted at top. The hot glass being dropped into the mold, a part, called the follower, answering to the inside or top of the vessel, or other article, is immediately pressed down upon it, by a lever, and the glass is thus stamped with a very distinct impression of the figure on both sides at once. The glass vessel is sometimes transferred from the mold to another receptacle, called the receiver, in order to preserve its shape, till it is cool enough to stand.

The name of cut-glass is given, in commerce, to glass which is ground and polished, in figures, with smooth surfaces, appearing as if cut by incisions of a sharp instrument. This operation is chiefly confined to flint-glass, which, being more tough, soft, and brilliant, than the other kinds, is more easily wrought, and produces specimens of greater luster. An establishment for cutting glass, contains a great number of small wheels, of stone metal, and wood, which are made to revolve rapidly, by a steam engine or other power. The cutting of the glass consists entirely, in grinding away successive portions, by holding them upon the surface of these wheels. The first or rough cutting, is sometimes given by wheels of stone, resembling grindstones. Afterward, wheels of iron are used, having their edges covered with sharp sand, or with emery, in different states of fineness, The last polish is given by brush wheels, covered with putty, which is an oxide of tin and lead. To prevent the friction from exciting so much heat as to endanger the glass, a small stream of water continually drops upon the surface of the wheel.

The name of staining has been applied to the process, by which painting, with vitrifiable colors, is executed upon the surface of glass. The pigments used are, chiefly, metallic oxides, which do not exhibit their full color, until they have been exposed to the heat of the furnace. This art has been repeatedly described, as being no longer known; but this is not the fact, except in respect to some particular colors, which are found in the windows of ancient cathedrals.

The metallic oxides, used in staining glass, are difficult of fusion; on which account, it is necessary to mix them with a flux, composed of glass with lead or borax. This renders the oxide fusible, at a temperature which does not injure its color; also by enveloping the particles, it causes them to adhere to the glass, and afterwards protects them from the atmosphere.

A very beautiful violet but liable to turn blue, is made from a flux, composed of borax and flint-glass, colored with one sixth part of the purple of Cassius, precipitated from muriate of gold by protomuriate of tin.

A fine red is made from red oxide of iron, prepared by nitric acid and heat, mixed with a flux of borax, and a small proportion of red lead.

A yellow, equal in beauty to that produced by the ancients, may be made from muriate of silver, oxide of zinc, white clay, and the yellow oxide of iron, mixed together, without any flux. A powder remains on the surface after the glass has been baked, but this is easily cleaned off.

Blue is produced by oxide of cobalt, with a flux composed of fine sand, purified pearlash, and red lead.

Black is produced by mixing the composition for blue with the oxides of manganese and iron.

To stain glass green, it may be painted blue on one side and yellow on the other.

The colors, ground with water, being laid upon the glass, must be exposed to heat under a muffle, so as to be heated equally, until the color is melted upon the surface. To prevent the panes of glass from bending, they are placed upon a bed of bone ashes, of quicklime, or of unglazed porcelain. A bed of gypsum has been recommended, but the sulphuric acid exhaling from it is apt to injure the glass.

Among the ancient specimens of painted glass, some pieces have been found in which the colors penetrate through the glass, so that the figure appears in any section made parallel to the surface. It is supposed that such pieces can only have been made in the manner of mosaic, by accumulating transverse filaments of glass, of different colors, and uniting them by heat, the process being one of great labor. They are described by Winckelmann and Caylus, from some specimens brought from Rome.

The great ductility of glass is one of its most remarkable properties. When heated to a sufficient degree it may not only be molded into any possible form with the utmost facility, but it can be drawn out into the finest fibers. The method of spinning glass is very simple. The operator holds a piece of glass over the flame of a lamp with one hand; he then fixes a hook to the melted mass, and, by withdrawing it, obtains a thread of glass attached to the hook. The hook is then fixed in the circumference of a cylindrical drum, which can be turned round by the hand, and a rapid rotary motion being given to the drum, the glass is drawn in the finest threads, from the fluid mass, and coiled round the cylindrical circumference. M. Reaumur supposed, with great reason, that the flexibility of glass increased with the fineness of the threads, and he therefore conjectured that, if they were drawn to a sufficient degree of fineness, they might be used in the fabrication of stuffs. He succeeded in making them as fine as a spider's web, but he was never able to obtain them of a sufficient length, when their diameter was so much reduced. The circumference of these threads is generally a flat oval, about three or four times as broad as it is thick. By using opaque and transparent glass of different colors, artists have been able to produce many beautiful ornaments. M. Bonnet and others have succeeded in obtaining glass fibers of such fineness and flexibility as to admit of being woven into cloth of a very brilliant, silvery appearance.

When and Where the Stars and Stripes were First Displayed.

Captain G. H. Preble, of the United States Navy, says the New York *Nation*, is collecting material for a history of the American flag, and has succeeded, he says, in getting together a good deal of anecdote, incident, and evidence concerning its origin, its transmigration (?), and its first appearance in various parts of the world. He informs the "Historical Magazine" that he has now no doubt that the stars and stripes were first displayed on the Thames by the ship *Bedford* of Nantucket. The *Bedford* was a whaler which left Nantucket under a pass from Admiral Digby, and arrived out on the third of February, 1783, twelve days before proclamation of peace was made, and only a week after the London newspapers had got hold of the terms of the treaty. In the London "Political Magazine" of February 7th, of the year above mentioned, is a passage which reads as follows:—

"THE THIRTEEN STRIPS ARE IN THE RIVER.—Mr. Hammet begged leave to inform the House of a very recent and extraordinary event. There was, he said, at the time he was speakings an American ship in the Thames with the thirteen stripes flying on board. This ship had offered to enter at the custom house, but the officers were at a loss how to behave. His motive for mentioning the subject was that ministers might take such steps with the American Commissioners as would secure free intercourse between this country and America."

It is a curious fact that the *Maria*, a vessel that has been named by some writers as a contestant for the honor due the *Bedford*, and which certainly was in the Thames in the course of the year 1783, is still afloat and in use. The Confederate States cruisers forced the old ship to take refuge under the Chilian flag, and she now sails from Talcahuana as a whaler. But the first display of the thirteen stripes in England was not from the masthead of a vessel. When the king, on the 5th of December, 1782, in his speech from the throne, recognized the existence of the United States as a nation, Mr. Copley, the painter, who was among his hearers, went home and put the new ensign into the background of a portrait, that of Elkanah Watson—which he had upon his easel at the time. He had kept the background unfinished, reserving it as a place "to represent a ship bearing to America the intelligence of the acknowledgment of American Independence, with the rising sun of the new born nation streaming from her gaff."

Interesting Facts.

A legal stone is fourteen pounds in England, sixteen pounds in Holland. A fathom, six feet, is derived from the hight of a full grown man. A hand, in horse measure, is four inches. An Irish mile is 2,240 yards; a Scotch mile is 1,984; a German, 1,806; a Turkish, 1,626. An acre is 1,840 square yards, 1 foot, and 3½ inches, each way. A square mile, 1,760 yards each way, contains 640 acres. The human body consists of 240 bones, 9 kinds of articulations or joinings, 100 cartilages or ligaments, 400 muscles or tendons, and 100 nerves, besides blood, arteries, veins, etc. Potatoes planted below three feet do not vegetate; at one foot they grow thickest, and at two feet they are retarded two or three months. There are no solid rocks in the arctic regions, owing to the severe frosts. The surface of the sea is estimated at 150,000,000 square miles, taking the whole surface of the globe at 190,000,000 square miles. Its greatest depth is supposed to be equal to the hight of the highest mountain, or four miles.

Transparent Soap.

A patent has just been issued to Morgan W. Brown of New York city, for the following method of making transparent soap:—

Dissolve or melt any settled curd or grained soaps in any suitable vessel to which heat can conveniantly be applied. As soon as the soap is melted and hot, pour into it from twenty-five to thirty pounds of sal-soda, previously melted without water, to every hundred pounds of soap while hot. Agitate the soap and sal-soda and very thoroughly incorporate the paste at a low degree of heat, as it mixes much better than at a high degree. Now pour slowly from 100 to 125 pounds of concentrated glycerin to every 100 pounds of the soap. Keep up a very moderate heat, and agitate the whole until it is a liquid, and thin as a sirup, and as soon as it forms a thin transparent fluid, let it settle well under cover, and draw off the settled fluid into the cooling molds or soap frames, when, as soon as it is cold and hard, it is cut into bars or cakes, in the usual manner, or cast in molds, press, etc.

Sulphuric Acid and Platinum.

One of the most valuable attributes of platinum, according to the text books, is that it is unacted upon by acids, yet M. Scheurer Kestner, of Thaun, has shown that not only are the platinum alembics acted upon when used in the manufacture of sulphuric acid, but he has also determined the amount of waste. In an apparatus yielding 8,800 pounds of concentrated acid daily, this production, he found, was attended with a loss of one-quarter ounce of platinum, even when the acid was nearly free from nitrous vapors, and as much as two or three times this amount when the acid was no freer from these vapors than it ordinarily is. New alembics suffer less than those which have been in use for a long time, because of the superior compactness of the metal when freshly hammered. For a remedy, he recommends adding sulphate of ammonia to the acid in the platinum vessel, that salt being decomposed by the nitrous vapors, and its base combining, thereby renders them inert. A still better remedy lies in the discovery that platinum containing iridium is much more durable than the former metal alone, and with a knowledge of this fact, all the platinum worked into alembics on the Continent, is now alloyed with a small portion of iridium.

Apparent Vegetable Growth from Paper.

Take a sheet or piece of ordinary writing paper, say commercial note, and saturate it in a solution of bi-chromate of potassium, 1 oz., with water 3 oz., and dry it in the sun. Cut the paper into squares of about three inches and double them back and forth until the form—a zigzag section—will stand on a table, and ignite the top of the slip. The result will be a slow combustion, the products of the combustion growing out of the edge of the paper like spears of grass and curling over to represent very faithfully the curving and depending leaves of the palm and cane. If the process is carried on without drafts of air the final result will be a bunch of beautiful blue-green filaments, while the process of combustion itself will prove a means of pleasant recreation.

PROCESS FOR COVERING IRON AND STEEL WITH COPPER WITHOUT A BATTERY.—This process, due to Herr Graeger, is described in a recent number of the *Polytechnisches Notizblatt*. The objects are first well cleaned, and then painted over with a solution of protochloride of tin, and immediately afterward with an ammoniacal solution of sulphate of copper. The layer of copper thus produced adheres so firmly to the iron or steel, that the different objects can be rubbed and polished with fine chalk without injuring the deposit. The tin solution is prepared with 1 part of crystallized chloride of tin, 2 parts of water, and 2 parts of hydrochloric acid. The copper solution, with 1 part sulphate of copper, 16 parts of water, ammonia sufficient to redissolve the precipitate formed when it is added. Zinc and galvanized iron can be treated, according to Boettger, directly by the copper solution, without using the tin salt. The above process may be found useful by gilders, and for various ornamental purposes.

M. Blondlot asserts that when phosphorus produces ozone by its slow combustion in presence of water, phosphoric acid is produced, which, in contact with excess of phosphorus, is partly transformed into phosphorus acid.