

Carbon.

This is one of the fifty-three simple substances known at present as constituting the materials of our globe. It has long been known under a number of different forms, such as coal, diamond, and plumbago. It exists both in the and inorganic organic kingdoms of nature, but it especially belongs to the latter, for the great coal deposits, which constitute its great store-houses, are undoubtedly of vegetable origin. It has been ranked by some writers as the base of organic nature.

The purest form of carbon, as ordinarily procured, is charcoal, which is developed by exposing animal or vegetable substances to heat, and excluding the air. The means commonly had recourse to for the preparation of charcoal are illustrative of a leading chemical quality of this body—its complete fixity even at the highest temperature, provided the accession of air is prevented.

When prepared from wood of different species, the resulting charcoal differs as to its density, its power of electrical conduction, and certain other characters; and on examining other forms of black carbon, such as anthracite coal, coke, and plumbago, other points of difference are recognized. Common bituminous coal is not carbon, but an association of many complex unions of carbon and hydrogen, from which heat expels the volatile parts leaving coke behind, which is a mixture of carbon with small quantities of metallic oxys.

Amongst the most interesting forms of black carbon is plumbago or black-lead—formerly considered to be a carburet of iron—but the best specimens of plumbago are free from iron. Lead is never present in plumbago, hence the appellation "black lead" is a misnomer.

The employment of plumbago in the manufacture of pencils is too well known to require comment. For this purpose the best quality of plumbago was the produce of Borrowdale, in Cumberland, England, but this vein is now quite exhausted. Most of the ordinary pencils now used are manufactured from a factitious paste, made of powdered plumbago, antimony, and sulphur, fused together, cast into blocks, and these blocks sawn into bars of the required length and size. The great disadvantage of these pencils is their grittiness, and the difficulty with which their marks are effaced by india rubber. The best of pencils are made by subjecting the powder of plumbago to extreme hydrostatic pressure simultaneously with the abstraction of all remaining traces of air by means of the air-pump.

A material very much like plumbago in appearance, and which is formed, under certain circumstances, in gas retorts, is called *plumbagine*. Ivory and bone black are varieties of charcoal which result from the concentration of ivory and bones in retorts.—They are employed for a variety of purposes. Ivory black forms a constituent of the finer kinds of printing-ink—that used for copper and steel plates. Bone black is chiefly used in the decoloration of raw sugar in the operation of refining. For this purpose the bone black is prepared in the state of grain, packed into large cylinders, and the colored sugar solution allowed to percolate through.

The most extraordinary and beautiful, as well as the most valuable form of carbon, is the diamond, a gem which has been known and valued on account of its resplendent beauty, from the earliest ages.

Its composition is undoubtedly carbon, because the sole result of its combustion in oxygen is carbonic acid gas; but the origin of the diamond is a subject of much curious speculation. As its structure is crystalline, the diamond has been at some early period in a liquid or semi-liquid condition—a state which pre-supposes fusion by fire, or solution in some menstruum. Opposed to the first hypothesis is the circumstance that within the structure of many diamonds are seen remains of organic beings—appearances scarcely consistent with the assumption that the diamond was once in a state of igneous liquidity. Sir David Brewster inclines to the opinion that the diamond is a drop of fossilized gum.

The extreme beauty which this gem is ca-

pable of assuming can only be developed by a tedious process of cutting, unknown even to this day in its full perfection by Eastern nations, and of somewhat modern introduction to Europe, viz., in the year 1456 by Louis Berghen, of Bruges, who accidentally discovered, that by rubbing two diamonds together a new face was produced. The diamond is so hard that it can only be abraded by portions of its own substance; hence, diamond powder is universally employed for that purpose; such stones as, on account of their inferior color or their flaws, are valueless as gems, being broken down into powder for the purpose of cutting others. At present, and for a long time past, the head-quarters of the diamond-cutting operation are at Amsterdam, Holland, where the operation is conducted by Jews exclusively.

The weight of diamonds is estimated in carats, 150 of which are equal to one ounce troy, or 480 grains. These carats are subdivided into halves, quarters, or carat grains, eighth, sixteenth, and thirty-second parts. The rule for the estimation of the value of diamonds is peculiar, and supposing the gems under comparison to be equal in quality, may be expressed as being in the ratio of the square of their respective weights. Thus, supposing three diamonds to exist, weighing, respectively, one, two, and three carats, their respective values would be as one, four, and nine.

Farmers have not yet learned the value of charcoal as an agent in fertilization. In the form of a dust it absorbs and retains ammoniacal solutions; and on sandy and clayey soils is valuable for retaining carbonic acid, which is positively necessary to the growth of every plant. Charcoal ground into dust, and mixed with manure, or sown on sandy and clayey soils, has a most beneficial effect in promoting the growth of vegetables.

Crystallization.

We copy the following beautiful extract from an editorial in the Philadelphia *Leader* :—

"Crystallization is found through all nature. There is not a substance, which, when allowed the free movement of its particles, does not exhibit a tendency to crystallize. Water at a low temperature crystallizes into ice. Metals slowly cooled after melting, crystallize. The gases, evanescent as they seem, may be made so artificially cold as to crystallize. Our children eat crystallized sugar under the name of rock-candy, and we ourselves use it in the loaf, crystallized in another form.

What is glass but a crystal? The sizes of crystals vary infinitely. There are crystals too small to be recognized except under a microscope; and there is one at Milan weighing nearly nine hundred pounds. The White Mountains of New Hampshire are a vast aggregation of crystals. The Mammoth Cave in Kentucky is an enormous museum of crystals. As yet, however, with all our knowledge, we are comparatively ignorant of the laws of crystallization. Under them, we see atoms arrange themselves by atom in mystic, myriad forms; we discover also, that not only magnetism, but light and heat exercise an influence in crystallization, but there our information substantially stops. The science of crystallization is almost a sealed book. Its mightiest curiosities still lie, like the virgin islands of the Pacific before the days of Cook, awaiting the skill and perseverance of some fortunate explorer."

Rosin Oil.

The following, from the *New Orleans Picayune*, affords evidence of the progress of the manufacture of rosin oil in New Orleans, and the use of rosin oil gas on plantations in Louisiana :—

"We some years ago announced the formation of a company in this city for the manufacture of oil from rosin, and now it affords us pleasure to be able to state that the undertaking has proved a complete success. The attempt to extract oil from such a substance was at first looked upon as simply ridiculous, for between rosin and oil there was nothing held to be in common. But there are more wonders between heaven and earth than ever was embraced in any man's philosophy; and the making of rosin oil is one of those recently developed wonders. The discovery was made

and patented by Mr. Robbins some four or five years ago, and has ever since been slowly though surely working its way into popular favor. Last spring a company, under the title of the 'New Orleans Manufacturing Company,' was formed in this city, with a capital of \$100,000; the patent right for this State was obtained; a site was purchased on the road side of the new canal, and now the works have been completed and are capable of turning out over 500 gallons of crude oil per day. To make paint oil, or the best description of lubricating oil, the crude article has to be twice refined, and altogether about ten per cent. of the original substance is dissipated in gases. Of the remainder, every portion is greatly superior in value, bulk for bulk, than rosin, while the greater portion of the product is worth from fifty to seventy-five cents per gallon. The oils produced by the various processes made use of are gas oil, paint oil, lubricating oil for machinery, tanners' oil, tallow oil for light-colored leather, bright varnish, naphtha, black varnish, cart grease, and pitch. The various kinds of oil are classed according to the number of distillations which they have undergone, and the residuum is pitch.

The success of the experiment thus far has been so satisfactory that the company has already determined to increase their works by the addition of two more stills. No fewer than two hundred planters have ordered sets of apparatus for the manufacture and use of rosin oil gas."

The Mesmerism of Machinery.

A Birmingham (England) paper describes the following remarkable case, which is stated to have taken place in one of the large iron manufactories in that place :—

"One of the most singular instances in connection with material things exists in the case of a young man, who, not very long ago visited one of our large iron manufactories. He stood opposite a large hammer, and watched with great interest its perfect, regular strokes. At first it was beating immense lumps of crimson metal into thick sheets, but the supply becoming exhausted, at length it only descended on the polished anvil. Still the young man gazed intently on its motion; then he followed its stroke with a corresponding motion of his head; then his left arm moved to the same tune; and finally, he deliberately placed his fist upon the anvil, and in an instant it was smitten to a jelly. The only explanation he could afford was, that he felt an impulse to do it, that he knew he should be disabled, that he saw all the consequences in a misty kind of manner, but that he still felt the power within above sense and reason—a morbid impulse, in fact, to which he succumbed, and by which he lost a good hand."

This story may be true; as wonderful events as this have occurred before. It certainly has a Baron Munchausen look about it, but we presume all have at times felt more or less of a similar temptation to thrust the hand into shears, gearing, or the like.

Louisville Mechanics.

The best criterion by which to judge the intelligence of any people, is from the means they employ to acquire useful knowledge. There is no city in the Union that can claim a more intelligent class of mechanics than Louisville.

At the commencement of the present Volume of the *SCIENTIFIC AMERICAN*, the enterprising publishers offered to the persons who should send them the twelve largest Clubs of subscribers by the 1st of January, 1857, one thousand dollars in Cash Prizes. The last number of that paper that has reached us contains the commencement of the awards, and the mechanics of Louisville, through the agency of D. McPherson, Esq., stand at the head of the list, for the first and highest prize of \$200. This is the second time this honor has been awarded to the mechanics of Louisville. First in 1855, and in 1856 they received the award for the second highest prize, and now again for the first. It affords us pleasure to make this announcement.—[Louisville Courier.]

[Our cotemporary could not have paid a more just and merited compliment to the mechanics of Louisville, than it has done in the above paragraph. As we cannot have a better test of the character of a man than "the company he keeps," so the best criterion of

the intelligence of any class of men, is just the means they employ to acquire useful knowledge; and, in this respect, the citizens of Louisville may well feel proud of the mechanics—they are not merely great readers, but good readers, and they have earned for themselves a noble reputation for intelligence and practical skill.

Genius under Difficulties.

The following case is one of such a rare and peculiar nature that we feel it our duty to present the correspondence, especially as the circumstances are therein explained in a very lucid and interesting manner. We copy, *verbatim et literatim* :—

Look out for Mistakes.

Pa. Jan 22nd 1857.

MUNN & Co DEAR SIR

Your favour of the 17th inst At one favour I ask of you if you will Please to Come here I will inform you of My Improvement And Should it be An unjust one as it is frequently the Case I am willing to go with you to Case New York and work for to pay your Expence for Coming here And further I think I have as good an improvement and Better for the Purpose Designed for Cheapness and Durability and if you do Not want to go to the Expence of Coming here Please send the Money and and you will Not be the loss of or Regret of it

As I am No Seffis kind of a Man the Reason I ask this Favour I have been on on a Deep Study for the Last 6 mo on different Plans Concerning the improvement to Find the Cheapest way of Putting the Machinery Where it is Designed My My Pocket Book beCame subject of the sweeny I will Come to a close By say My Pen is Bad My ink is Pal My up-right and Contrite heart to you Shall Never Fail

Yours Truly

G. W. L.

I think We Can Come to terms for I Like to Live While I am Alive and I Like to See others Live too

you Can find Me By Enquiring of David P Browns Coal works at Mount Laffe David Lives in Market Street Most any Body Can show you Where he Lives

Want of time and funds will, unfortunately prevent us from following up this promising case.

Growth of Coral Islands.

The reef building coralline will not operate in water of a mean winter temperature less than 68 deg., which circumstance confines it principally to the torrid zone. It is for this reason that corals do not grow on the coast of South America. On our own coast they grow to a greater distance north than elsewhere, owing to the presence of the Gulf stream. Their growth is also limited by the depth of water—ten or fifteen fathoms. Another condition is that the reef coral will not grow in fresh water, nor in turbid or muddy shores. Whenever rivers or muddy waters pour into the sea, there is a break in the coral reef. The washing of the waves is also necessary to its growth; consequently it will thrive on the windward side of an island when it will not on the leeward side. At first, when a coral island is formed, it gives growth only to the lowest order of vegetables, such as feed on air. These decay, and thus leave a little soil which by and by sustains a higher order of plants. These islands seldom rise more than ten or fifteen feet above the water, and are seldom more than half a mile broad. There is a vast area in the Pacific 6000 miles long by 3000 wide, without any coral islands.

Rise and Fall of Water in Lake Erie.

At a recent meeting of the Cleveland (O.) Academy of Natural Sciences, Colonel Whitteley exhibited tables and diagrams of the rise and fall of water in Lake Erie, from the year 1796 to 1852, the maximum being in 1838, the minimum in 1819 and 1820, the variation being 4-55 feet. Rain gauges were kept for various periods in different places in the lake region. He also stated that, by a long course of observation he had discovered the existence of a short pulsating wave in this chain of lakes, and entirely independent of winds or currents. Its altitude does, in no case, exceed eighteen inches—more commonly four or five. Its periods of vibration are short.

The sum of \$5,060,000 has been paid by our government to the Collins' line for carrying the mail.