in poor barren soil grow to the height of ten inches which would reach the size of twelve feet in rich or more convenient soil. For this reason it is often very difficult to recognize these two so unequal individuals as sisters.

Many other plants, however, are so dependent on a certain admixture of soil, that their appearance can serve as a true hint to geologists for the discovery of certain strata of earth. As, for instance, we can surely depend on finding a layer of zinc, where *Viola calaminaris*, *Statice Ameria* and *Spergula muscosa* grow naturally on the surface.

While these three plants indicate the presence of zinc, other kinds in return point to the layers of lead, copper, iron, coal, lime, chalk, gypsum, marl, &c.

A very interesting demonstration in regard to the abilities of plants to accommodate themselves to conditions of locality, presents itself to the naturalist in swamps which are occasionally inundated, particularly if the water on some places is kept running for some time. For instance, plants grown in swamps, and constructed to live in the open air, would certainly be drowned, when set under water for a long time, if they were not provided with the means to rescue themselves from such a dilemma. Under this difficulty, full grown plants begin once more to grow, not seldom to a great extent until they have reached the surface of the water, where the leaves lay down; while the stem takes up again its ordinary functions. On places, however, where the water is running, the plants or their parts will appear in entirely different forms; namely, by the continual side pressure of the water the new growth will be unnaturally extended, or, as if it were, pulled into the shape of long slender threads, and the foliage will undergo a similar change, whose flat forms were altered into long thin splits. In case such an extended stem should reach a place where the water stands still, the leaves will appear again in their original large shape. When the water on such inundated places runs off or is evaporated, the plants become so tender that they cannot live in the open air any more. The whole growth, therefore, must decay, as deep as to the roots, and the new plants which shall spring up from them appear also in their original form again.

These and other similar changes in the forms of plants bring young botanists often into great confusion, and have also given rise to many discussions and different opinions among the experienced.

(*To be continued.*)

CHEMISTRY BY THE FIRESIDE.

(*Continued from Page* 180)

No. 15. Carbon.

We come now to one of the most interesting of the elements. Carbon exists in some form in all the kingdoms of nature. It is in one form among the cheapest of substances, and in another the most costly. Your charcoal, your mineral coal, your black lead, and the diamond are only different forms of carbon. If you knew how to crystalize charcoal, you could make diamonds for your own use. A vast number of experiments have been made to obtain diamonds by artificial means, but like perpetual motion, it is probably one of those things beyond our reach.

I wish to introduce a new term called allotropism. It has been found that the element sometimes exists in different forms, and possesses entirely different properties. This is strikingly the case with reference to carbon, for it exists in three distinct forms, charcoal, plumbago, or blacklead, and the diamond. They call this condition allotropism. The diamond has been seen by mineralogists in its native rock. There is a mystery still hanging over the minds of naturalists with reference to its native rock. It is usually found in the loose sands of rivers, and generally where gold and platinum abound. The diamond is well known as the hardest substance in nature. It can be ground and scratched only by its own dust.—Hence its great value in jewelry and for cutting glass. The planes of these crystals are curved, and when they come to a point they are set in a handle and are used for cutting glass. The diamond is so much harder than the glass that it actually cuts into the glass as clear a cut as a sharp knife cuts into a piece of pasteboard. It is not a scratch then, but a cut that causes a piece of glass to separate. If you burn the diamond, it will produce the same result as when you burn charcoal. This is proof positive that it is pure carbon.

Carbon exists in vegetable matter. When you burn wood for charcoal you drive off a large portion of the other elements, and have left nearly pure carbon.— This is really an experiment in chemical analysis. This form of carbon is indestructible like any other element. Bury it in the ground, and it will remain there for thousands of years unchanged. Fresh charcoal will absorb large quantities of air and other gases. Hence it is found to be a good disinfectant. Take some charcoal just burned, powder it up, and bury a piece of tainted meat in it, and it will be materially improved. It combines readily with oxygen in combustion, throwing out a great deal of heat.

Mineral coal is another form of carbon. Go to a blacksmith shop when it is used, and you will find the variety known as bituminous coal. It smuts the fingers. It burns with a good deal of smoke. Anthracite coal is not smutty. It has a shining, metallic lustre, burns almost free from smoke, and makes an extremely hot fire.

Plumbago, graphite, blacklead, are all the same thing. This is another form of carbon. It is found in the rocks in beds, and contains a small per cent. of iron in combination, though the latter only appears as an accidental substance. You are familiar with this substance in your lead pencils. It withstands a high degree of heat. Consequently the chemist has his crucibles made of plumbago. Thus you see that carbon is an abundant element in nature. In our next number we shall notice more of the compounds of carbon, when we shall learn that it is still more abundannt.

No. 16.—Carbonic Acid.

We told you last week that charcoal, mineral coal, and the diamond, were the same thing under different forms, and that we give them all the name of carbon. Suppose now we burn a piece of char-