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WATER AS FUEL.

Among the attractions at the Colosseum in this city, where the wonderful views of London and Paris are exhibited, are certain practical demonstrations of scientific phenomena, conducted in the side rooms. Here we found a lecturer who has the merit of successfully illustrating his points with some of the most striking standard experiments of the chemical lecture room, but the theories he propounds are not always consistent with the present state of scientific knowledge.

During one of his recent lectures, we heard him expound the idea that, at a future time, when all the wood and coal have given out, we shall use water as fuel, as it contains large amounts of the combustible hydrogen, and is everywhere present in unlimited quantities. Such an idea would have been pardoned forty or fifty years ago, before the doctrine of the correlation of forces was established, before the nature of heat was known, before the mechanical equivalent of heat was determined, and before we knew how to account for the heat of combustion; but it is untenable at the present day, when we know that the heat developed and diffused when the oceans were formed (by the combustion of almost all the hydrogen on our earth) must be given back to this hydrogen, in some form or other, before we can reconvert it into the combustible gas.

In fact, the waters on the surface of our earth are nothing more nor less than the result of the burnt hydrogen, which gave out its heat at the time of its combustion. We know at present that this heat pre-existed in the gaseous hydrogen, stored up in its atoms or molecules. We have become convinced that the atoms or molecules of a gas are not in fixed positions, but move in straight lines or elongated ellipses, hurrying to and fro, encountering their neighbors, rebounding and continuing their course in a new direction, according to the established laws of impact of elastic bodies. They do not move with exactly the same velocity, but their mean velocity is, for hydrogen gas at the temperature of 32° Fah., about 6,100 feet per second, while it increases 12·5 feet for every degree of rise of the thermometer; so that at 522° Fah. or 12,200 feet per second, at which temperature the gas must consequently, under the same volume, exert double the pressure, they will possess twice the velocity.

A pound of ice-cold hydrogen gas possesses, therefore, an internal energy as great as that of a pound ball moving 6,100 feet per second; and it is this energy which is taken from it when changed from its gaseous state, to which, in the case of combustion, is added the internal energy of the oxygen; hence the result that, by the combustion of every pound of hydrogen, an energy is developed of 62,030 units of heat, equivalent to 47,888,400 foot pounds, which means that it is sufficient to raise a weight of 23,944 tuns a foot high.

It is evident that this energy cannot be developed for the second time from the hydrogen in the water; but, on the contrary, it must be given back in case we wish to separate the two elements composing the water. One of the means of effecting the separation is great heat. By passing steam through a white hot platinum tube, it is decomposed into its elements, while a part of the heat applied totally disappears, to be changed into the molecular motion of the gases. A second method is the electric current. When we pass a sufficiently powerful current from a voltaic battery through the water, the latter will be decomposed into its separate elements; while the electric energy, apparently disappearing, becomes in its turn transformed into the molecular motion of the gases. The third method is found in the play of those energies which we call chemical affinities. In this case, the most simple illustration is the introduction of a piece of sodium amalgam under a bell jar containing water. The sodium oxydizes, and the energy developed by this oxidation is appropriated by the hydrogen, which thus finds the conditions under which it can assume again the hidden molecular motion necessary for its existence in the gaseous state.

It is evident from the above that it is as impossible to burn the hydrogen in the water, or in its vapor, as it is to burn the carbon in the lime rock or in the atmospheric carbonic acid. No fuel can be burnt up twice; and as the hydrogen contained in water has been once burned, and has thus lost its heat, any hope of obtaining heat out of it again, without first introducing heat, must be vain.

THE HORSE IN MARKET.

Modern life broadens in two ways: by the development of new customs and by the revival of old ones. Whenever the causes which led to the abandonment of the customs of former times seem insufficient or inoperative under present conditions, there is a tendency to reëstablish them, thus giving to our civilization a scope and variety never before enjoyed. Our range of food is specially wide and varied in consequence. All the world is laid under tribute to supply our tables, and we are learning to imitate or improve on every culinary process of every nation and every age.

One of the most important revivals of late years is the use of horse flesh, which for centuries has been under ecclesiastical ban except among the sturdy people just now preparing to celebrate their first millenium.

Curiously it was through the people whose prejudice against horseflesh remains most intense that the revival began. During the siege of Copenhagen by the English, in 1807, the scarcity of provisions compelled the Danes to eat their horses; and the practical knowledge of the quality of the meat thus gained led them to continue its use after the original necessity had passed away. Possibly the example of their Icelandic allies may have had a good deal to do with the breaking down of Danish prejudice in the matter. In Iceland, the practice had survived from the first. The islanders were willing to have their souls saved by the Church, but they would not submit to any interference with their stomachs; so, rather than lose them, the Church gave them special permission to eat the "execrable food," which they have continued to do to this day.

The first State to imitate the example of Denmark was Würtemburg, which legalized the sale of horseflesh in 1841. Bavaria followed in 1842, Baden in 1846, and Hanover, Bohemia, Saxony, Austria, and Belgium the year after. In 1853 the prejudices of Switzerland and Prussia were overcome, and two years later Norway and Sweden were added to the list of countries authorizing the sale of the long rejected food.

The struggle against religious prejudice was continued eleven years longer in France, though an impression prevails that the revival is a Gallic eccentricity, rather than the result of Germanic good sense.

At one time the feeling against the use of this heretical diet must have been exceedingly intense in the land of good cooking, for it is on record that as late as 1629 a man was condemned to death and executed in France for the crime of eating horseflesh on a Saturday in Lent.

A hundred and fifty years later, the use of the abhorred flesh was publicly advocated by a French physician. Not many converts to the doctrine were made, however, until the retreat from Moscow. During that terrible march, when the alternative was starvation, the French soldiery ventured to eat their disabled horses, and discovered that horse flesh would not only sustain life, but was really savory and inviting. Several of the surviving officers afterward endeavored to break down the prejudice against horseflesh, and advocated its regular use in times of peace, but without much effect.

More strenuous efforts were made by French savants after the surrounding countries had demonstrated the advantages of the change, and a grand hippophagic banquet was celebrated at the Grand Hotel in Paris early in 1865. In the meantime, the meat had begun to appear in the markets as beef, and the government was forced to authorize its sale under proper restrictions to prevent the exposure of uninspected cuts. The decree was published in 1866, and during the ensuing year upward of two thousand horses were slaughtered for the markets, after having been passed by a veterinary surgeon; and not one of them, on inspection after killing, proved to be in an unhealthy condition. The sale and use of horse flesh has largely increased in Paris since then, and the practice is equally common in all the countries of Northern Europe, save Holland and Great Britain, much to the benefit of the people and the improvement of the stock of horses. In Russia the custom has always prevailed, the Greek Church never having meddled with the matter.

The English, like ourselves, occupy an extremely absurd position in regard to the use of horse flesh. We both eat it in large quantities, yet profess to consider it unfit for food.

It is true that, of the thousands who give the meal a place on their tables as an imported delicacy, very few are aware that it is horse flesh. Possibly the most of those who use it would reject it if they knew its real character; nevertheless the fact remains that horse flesh is largely eaten here and enjoyed, and the inference is legitimate that the flesh of American horses would be found just as savory and just as wholesome.

We call the article, which is kept for sale by every first class grocer, Bologna sausage: so called for the excellent reason that it is manufactured at—not the Italian city of the name—but at Boulogne.

Originally the basis of Bologna sausage was asses' flesh, a more delicate meat than that of the horse, though not less obnoxious to common prejudice. Latterly, however, horse flesh has been its chief component, not used secretly, but openly, since at the place of manufacture the sale and use of horse flesh is as legitimate as the sale and use of mutton or beef. For sausage making, indeed, the flesh of the horse is a safer ingredient than any other meat. No other will bear so well to be eaten in a raw or partially cooked state, as it is free from the trichina which makes raw pork so dangerous, and the undeveloped tapeworms which infest both beef and mutton.

To a greater extent than here the abominated meat is eaten in England, and under less favorable conditions; for in addition to the wholesome Bologna, large quantities of suspicious horse flesh disappear—down the throats of deceived humanity, doubtless—every day in London and other English cities. The animals—broken down hacks and the like—are known to be killed, ostensibly for cats' and dogs' meat, but the amounts sold by the hawkers of that sort of stuff fall far short of the supply. The difference disappears as horseflesh, but reappears, there is reason to believe, as human food under other names. The Parisian caterers called it "*bifsteck à la cheval.*" It is altogether likely that the cockney caterers, less honestly, stop at beef, the resemblance of horseflesh to that much respected commodity being so close that, whether raw or cooked, it would require an expert to detect the cheat.

HOW TO TREAT FRUIT TREES.

In considering the growth of organisms, the action of the alkalies is to be looked upon as scarcely less important than that of air and water. Lime is the great animal alkali, and potash the vegetable one; its old name of vegetable kali expressed that fact, and all the potash of commerce is well known to be derived from wood ashes. The importance of potash as a manure has been frequently overlooked by farmers, who rarely know the large amount of this material found in grass, grain crops, leaves, barnyard manure, roots, and fruits. How potash acts in plants, in conjunction with carbon and silex, to form woody fiber, starch, sugar, and oil, is yet unknown to chemical observers, but the fact of its action is beyond a doubt. Liebig long since pointed out that the chief cause of barrenness is the waste of potash carried off by rich crops, especially tobacco, with no replacement by proper manure. How many millions of pounds of potash have been sent to Europe from the forests of America, and in the grain, tobacco, and hemp! Luckily one alkali may be replaced by another, and we have received a considerable quantity of soda from European seaweed and in the shape of salt. Latterly, nitrate of soda from natural deposits in South America is brought to us at a cheap price.

The point to which we now call attention is that our farmers and fruit growers have ignored, or rather been ignorant of, the importance of wood ashes as a vegetable stimulant and as the leading constituent of plants. Even coal ashes, now thrown away as useless, have been shown, both by experiment and analysis, to possess a fair share of alkaline value. According to our observation, if the practice of putting a mixture of wood and coal ashes around the stems of fruit trees and vines, particularly early in the spring, were followed as a general rule, our crops of apples, grapes, peaches, etc., would be greatly benefitted in both quality and quantity, and the trees and vines would last longer. We will relate only one experiment. Some twenty-five years ago, we treated an old hollow pippin apple tree as follows: The hollow, to the hight of eight feet, was filled and rammed with a compost of wood ashes, garden mold, and a little waste lime (carbonate). This filling was securely fastened in by boards. The next year, the crop of sound fruit was sixteen bushels from an old shell of a tree that had borne nothing of any account for some time. But the strangest part was what followed. For seventeen years after the filling, that old pippin tree continued to flourish and bear well.

Let us call attention to still another point of importance in fruit-raising. This is the bearing year for apples and fruit in general in New England; probably it is also in some other parts. Now when such years come, the farmers rejoice too much at their prosperity and abuse it, as nearly all people do the gifts of fortune. We should be temperate as to the quantity of our fruit as well as of our fruit juices. By proper trimming and plucking, the apple crop in bearing years may be reduced to but little more than half a crop as to number, but the improvement in size and price, and in the future effect, will more than balance the loss. Next February, March, or April, according to latitude, let the tree trimmer stimulate and nourish his trees and vines with a fair supply of ashes; and in nearly every case he will have a good crop of fruit in the non-bearing year.