CHEMISTRY

Rubber From Coal

By Edwin E. Slosson

Everybody in America who owns an automobile—or rides in one—is concerned by the two recent announcements of the German Chemical Trust. First that synthetic gasoline may be made at marketable prices from coal. Second that synthetic rubber may be made at marketable prices, also presumably from coal. Since we consume more gasoline and rubber than any other people in the world we are most interested in the reported discoveries. They belong to the news to be classified as "important if true."

In both cases the chemistry is correct but the practicality is questionable. It has been known for many years that both processes are possible but it has not yet been proved that they are profitable. I have here in America seen and smelled samples of synthetic gasoline and synthetic rubber but the cost of production was not specified, which is of course the crucial point. A famous professor of metallurgy used to make this point plain to his students of the school of mines in the first sentence of his first lecture by defining his subject as "Metallurgy is the art of getting money out of ores"—instead of the conventional fashion of "the art of getting metals out of ores." In certain parts of our country petroleum gushes from the ground faster than it can be shipped and sold, and until our oil fields run dry, some years hence anyhow, we are not likely to take to making gasoline out of coal, shale or anything else. Rubber is now being grown on the British and Dutch plantations in the East Indies at less than thirteen cents a pound. Now it has hitherto been impossible to find any raw material and any factory process that would produce rubber at a lower price than this.

One reason why American experts are inclined to question this present statement of the German Chemical Trust that synthetic rubber would "soon appear on the world markets as a commercial commodity, equal to natural rubber and cheaper in cost" is because they remember that same claim was made by the same parties fifteen years ago and it did not turn out to be true. At the International Congress of Applied Chemistry in New York in 1912, Dr. Carl Duisberg exhibited with justifiable pride two automobile tires made of artificial rubber and rashly boasted that

(*Just turn the page*)

NATURE RAMBLINGS

By Frank Thone

Beaver's Little Cousin

Many persons are incredulous when they are first told that the beaver is a rodent, and more or less close kinsman of rats and mice. His size, his utterly unratlike tail, above all his astonishingly complex set of instincts, seem to set him off from these household pests even more remotely than man is set off from monkeys.

There is, however, an excellent intermediate animal to serve as connecting link between the beaver and the more familiar rodents. Nobody will deny that the muskrat is a rat, in spite of his larger size and longer fur. His teeth and his tail alike proclaim the kinship.

As his bodily build marks him an unmistakable rodent, so do his habits point beaverward. He is quite as aquatic as his larger cousin, and like him lives on a diet of twigs and green stuff at the water's edge, though he doesn't go in for quite such ambitious gnawings. Like the beaver, the muskrat builds domed winter houses out of mud and sticks, though these again are not so pretentious. Finally, just as the muskrat lives in burrows as well as in houses, so also do beavers resort to the river banks. "Bank beavers" are quite familiar animals to naturalists, though they are not played up much in most natural history books.

The muskrat has survived contact with civilization much better than the beaver, partly because of his greater multiplying powers, partly because he is less fussy about interference with his works, and partly because at first his fur was not held in very high esteem. Now, however, with the increasing rarity of the more valuable pelt-bearing animals, muskrat is coming into greater favor, both on its honest own and plucked and dyed, under a variety of trade names.

METEOROLOGY

Tropical Storms From U. S.

"Northers," severe storms of the Gulf of Mexico and the Caribbean Sea, which are most numerous in the winter months, start as cold waves in the Dakotas, and wreak their havoc in the Middle West before going to sea. This is the statement of Willis Edwin Hurd, of the U. S. Weather Bureau, who has been studying these storms and their origin. "From the very nature of the norther," says Mr. Hurd, "one recognizes the fact that it is dependent for its strength and maintenance upon the magnitude, movement, and relative positions of the high and low pressure areas crossing the United States and the waters to the southward."

Mr. Hurd describes the formation of the norther:

"A blizzard sweeps down from the northwest, the high wind blowing along the eastern wall of the anticyclone. The air is biting with intense cold and blinding with fine snow particles so thick that they obliterate all objects more than a few feet from the eye.

"Meanwhile, as the storm descends from the Dakotas, the air over the Texas plain is warm and humid, with a springlike balminess characteristic of many of the winter low-pressure areas of this region. Suddenly dark clouds, advancing slowly or with tumultuous rapidity from the northward, mark the southern squall line of the storm wave. Here comes the blizzard; but now, if we wish, we may call it a 'Texas norther.' The first blast of the squall is cold. If rain has been falling, the precipitation may quickly change to sleet or snow. This, with the sharp fall in temperature, is highly disagreeable to all living beings, even deadly if accompanied by too long exposure, while it is disastrous to tender vegetation. If there has been no precipitation preceding the burst, and none should happen to follow it, the norther may be classed as dry instead of wet.

"The anticyclone continues to advance southward, meanwhile spreading toward the east. It reaches the coast and enters upon the waters of the Gulf of Mexico. There great velocities may be developed, and squalls of even greater intensity may occur along particularly exposed portions of the coast. Meanwhile the line of frost also advances into the southland. A freeze threatens the orange groves. The inhabitants of

(*Just turn the page*)

Tropical Storms from U. S.

(*Continued from page 373*)

eastern Mexico, even of Honduras, the Florida Keys, and of Cuba, perhaps shiver under the influence of the unwonted chill. Small streams of the norther flow over the Mexican passes of the Cordilleras into the Pacific, but the great main current presses on to the southward and eastward, into the Caribbean and toward the open Atlantic, not only cooling and disturbing the eastern littoral of the upper Central American States and adjacent waters to the West Indies, but finally perhaps venting the last feeble puffs of its energy upon the harbors of Panama and even the more distant coasts of Colombia.

"Thus, for this is not merely an ideal picture, has the fierce cold wave and blizzard of the Dakotas penetrated as a norther into the Equatorial Zone."

Science News-Letter, December 10, 1927

The mass of a body increases with its velocity, but this difference is so slight that a 100-ton locomotive going 60 miles an hour will weigh only a billionth of a pound more than when it is standing still.

News-Letter Features

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Rubber From Coal

(*Continued from page 373*)

"synthetic rubber will certainly appear on the market in a very short time." But "in a very short time" after that Germany was barricaded by the Allied Armies and rubber was wanted at any cost, yet the German army automobiles had to run on steel tires.

But since the war very great progress has been made in Germany, in the manufacture of organic compounds from coal. The Bergius process for making petroleum by combining hydrogen with coal has shown sufficient promise of proving practical and profitable that the Standard Oil Company of New Jersey has invested in it. The Fischer process of making methanol alcohol from coal has cut under our process of making it from wood.

Now the products of these processes for the liquefaction of coal include various compounds out of which rubber may be made, for instance acetic acid, acetone butadiene and isoprene. So it is quite likely that some catalyst has been found which will short-circuit the process of preparation of one of the various materials and so cheapen the passage from coal to caoutchouc.

But after the chemist has done his work and produced a substance identical in composition to the natural rubber the task is still only half done, for the milk that exudes from the cuts in the rubber tree is made up of miniature globules which confine in an elastic membrane a network of minute rods and chains enmeshed in lighter liquid. When the drops are stretched the nets form a stiff lattice held in place by strong tension of the covering skin. In this crystalline structure of the natural rubber, revealed only recently by the X-ray, lies the secret of its usefulness, its incomparable elasticity and resiliency. Rubber is easy to stretch but hard to break. Hitherto none of the artificial rubbers have the peculiar cellular structure of the natural and therefore none has equalled its "stretchability." The rubber made by the Germans during the war was found satisfactory for hard rubber articles but not for soft. If now this difficulty has been overcome as well as the high price of production, the future of synthetic rubber is assured.

Science News-Letter, December 10, 1927

In the course of a day, an average tree manufactures some 20 pounds of starch.