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(Editors: This is a timely, authoritative article on the gasoline situation that will be of interest to everyone who runs an automobile).

### TEMPORARY GASOLINE EXCESS NOW DOES NOT SOLVE MOTOR FUEL PROBLEM

By E. H. Leslie,  
Associate Professor of Chemical Engineering,  
University of Michigan.

(Science Service)

At present petroleum is being produced faster than it is used, and stocks of gasoline are increasing. Crude oil produced in Oklahoma has dropped in price from \$3.50 to \$1.00 per barrel, and the price of gasoline has been lowered several cents per gallon. But one should not be misled by the present situation, which is only a part of the business cycle through which we are passing. It is a peculiarity of the oil producing business that the drilling of new wells reaches a maximum at the crest, or even after the crest, of the wave of prosperity. The result is an over production of crude oil in the time of depression. Prices drop, profits vanish, and new drilling stops. But within a year or two the pendulum swings the other way, and again there is a scarcity of oil due to the interruption of drilling in the time of depression. This cycle of events would take place even if there were an endless supply of crude oil underground.

The real motor fuel problem is not concerned with the swings of the business pendulum, although the present abundance of fuel is pointed to by superficial critics as showing how wrong have been the predictions of the scientists that have warned us of a future shortage.

The problem arises in part through the fact that the underground reserve of petroleum is limited. At present the unmined reserve of the United States is only about 5,800,000,000 barrels. Were this oil to be extracted from the ground at a rate equal to that of the year 1920, a feat that is quite out of the question from a practical standpoint, the reserve would only last thirteen years. It is thus evident, however, that after a few years we must expect a decline in the domestic production of petroleum.

On the other hand, the use of automobiles, tractors, trucks, and gasoline engines is becoming more general. Only 25 years ago there were but four automobiles in the country. One was in a circus, another was used for exhibition purposes, and two were regarded as mechanical freaks. Today the total number of registered motor vehicles is over nine million, an almost unbelievable increase in the short period of 25 years. What is more, the number is still growing, and will probably exceed 13,000,000 within a few years.

Where are we to get the fuel to run this vast number of cars? So far there has been little difficulty as we have depended largely on greater draughts upon natural deposits. True enough, we have changed the nature of the commodity we know as gasoline. Its boiling range, that is the range of temperature over which it distills, has been broadened, with the result that the amount of gasoline obtainable



from a barrel of crude oil has been increased 50 to 75%. Also, gasoline has been extracted from natural gas by processes involving either compression and cooling, or oil-washing and cooling. And too, we have produced "synthetic gasoline" or "cracked gasoline" on a moderate scale. The processes for the production of these last named fuels involve the heating of the oil in liquid or vapor form. At the present time these gasolines comprise 15 to 20% of the total quantity of gasoline marketed. The development and more extensive use of these processes may be expected. It is probable that their use will be the most important means of bridging the gap between present and future sources of motor fuel.

The quality of market gasoline will not change greatly in the next few years, at least not until the automotive engineers perfect devices that will handle heavier and less volatile gasoline satisfactorily.

In spite of the fact that for several years the United States has produced two thirds of the world's oil, we have recently been dependent upon foreign sources of supply of crude oil. 80% of the world's oil is consumed in this country. In 1920 our imports were 110,000,000 barrels or 25% of our domestic production. This oil came largely from Mexico. As the years pass, the United States will become more and more dependent upon imports of petroleum. This will mean higher prices and therefore necessitate more efficient utilization once the oil is in this country.

What other possible sources of fuel are there? Much has been heard of shale oil and of alcohol. Neither of these commodities will be important as motor fuels until many far reaching developments have taken place. The development of a shale oil industry on a scale sufficient to furnish large quantities of motor fuel is an undertaking comparable to the creation of the whole coal mining industry of today. And to produce alcohol we must first have available suitable raw material. It is quite out of the question to make large quantities of fuel alcohol from food materials such as grain and potatoes. Possibly wood may be the future source of alcohol, and reforestation of waste areas, the means of supplying the wood.

Lastly it is probable that necessity will be the mother of invention in methods of utilizing fuels. Present engines and devices for carburetion will be modified in such a way that where we now drive a car 10 to 20 miles on a gallon of gasoline, we shall later be satisfied only with twenty to forty miles. The chemist will be called upon to study what happens within the engine cylinders and to find means of producing more salutary results.

Let us not allow the momentary oversupply of gasoline to blind us to the real situation. The cooperation of scientists, commercial interests, public, and government is needed for the successful solution of the problem.

#### THE NEXT GREAT STEP AHEAD

##### 9. In Fruits.

An interview with David Fairchild, Agricultural Explorer in charge of the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture.

(By Science Service)

The favorite fruit of Americans of the generations to follow us will be the avocado or "alligator" pear. That this large meaty tropical fruit will be a common daily food of the future is the opinion of David Fairchild, in charge of the U. S. Department of Agriculture's work of introducing new and useful seeds and plants into this country.

"A few crackers and an avocado sprinkled with a little salt make a hearty and well balanced lunch", declares Mr. Fairchild.

Although over 1200 acres of avocado trees are now planted in Florida and California, "the tropics of the United States", the alligator pear is still a rich man's fruit. Eventually, Mr. Fairchild believes that it will be just as well



known and as popular as oranges and lemons.

"But unlike an orange or lemon, the avocado is a real, complete food", he explains. "It is a round or slightly pear shaped fruit with meaty flesh that reminds one of ripe olives in texture, and that has an indescribably delicate nutty flavor. There is a seed in the center, and it has a skin that acts as a protective case for the edible flesh when the fruit is transported or handled".

The avocado is a native of Central America and the West Indies, and the varieties that hold out promise of becoming a national foodstuff have been brought to this country by the explorers of the Department of Agriculture who penetrate foreign lands in search of trees, fruits and vegetables that will be of value to the American public.

Guatemala has been the principal source of avocados that are well suited to this country's warm regions because of hardiness and resistance to late frosts. Wilson Popenoe, agricultural explorer, has tramped over that small Central American republic and sent back cuttings from the best trees for propagation here.

"The natives of Guatemala use the avocado as a daily article of food throughout more than half the year", Mr. Popenoe relates. "They prefer them to the bananas which are grown mainly for export, while the entire avocado crop is consumed in that country. There are, however, no orchards or regular plantations of avocados there, but the 30 to 40 foot trees are usual food-producing ornaments of the native door-yard. Little ingenuity in using this food is displayed by the native Indians, who usually eat the fruit just as it is, but the Guatemalans of European blood use it as a flavoring in soup, and often serve a salad called guacamol, composed of mashed avocado pulp, vinegar, salt, pepper and finely chopped onion".

Unlike the orange, the popular tropical American fruit of today, the avocado is not a strictly seasonal fruit. In Guatemala there have been found certain trees that ripen at different times of the year, and the importation of cuttings from these trees into this country has resulted in a sufficient number of varieties so that there will be avocados ripening the year around.

In the tropics there are insects and diseases that are destructive enemies of the avocado, but the future avocado groves of America are not likely to be seriously injured by them. The careful inspection by government entomologists of material from the tropics has prevented many of them from entering the United States.

"But the raising of avocados is a white man's job", declares Mr. Fairchild. "A high order of intelligence is needed and improved methods of culture including frequent spraying must be practiced".

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#### BRAZIL TO HOLD CENTENARY CELEBRATION NEXT YEAR

(By Science Service)

Rio de Janeiro, Brazil. July .- When Brazil celebrates its centenary of independence in September 1922, there will be held among other festivities a national exhibition which will include exhibits from all Brazilian activities and from many foreign governments. Congresses of primary instruction and secondary and higher education will be organized by the mayor of Rio de Janeiro and the Brazilian Historical and Geographical Institute.

One of the famous hills of the city has been leveled out into the bay and this has formed a site for the exhibition buildings.

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(Editors: This is another batch of meaty two and three liners that can be used as a daily feature or as handy fillers.

DO YOU KNOW THAT-

A prehistoric form of dragon fly, found in coal deposits in France, had a body 16 inches long, and its wings spread over 28 inches.

Discoveries about radium throw doubts upon the old belief that the earth is steadily losing its internal heat. If there is as much radioactive matter per unit volume throughout the interior of the globe as has been found in its crust, the earth is actually heating up by virtue of the heat given off by this substance in the process of disintegration.

Aeroplanes are now used on an extensive scale for locating appropriate scenes in which to take motion pictures.

Covered garbage pails and other modern improvements have made the common housefly a scarce insect in New York City. Many large apartment houses in that city no longer provide fly screens.

A shoot which sprang from the trunk of a beheaded Paulownia tree near Raleigh, N. C., grew in a single season to a length of  $19\frac{1}{2}$  feet.

DO YOU KNOW THAT-

The "tornadoes" of West Africa are thundersqualls, totally different from the exceedingly violent small whirling storms that bear this name in the United States.

Ten American universities conferred degrees on Madame Curie during her recent visit to this country.

The first radio telephone to be opened to the public in this country was recently established between Catalina Island and Long Beach, California, a distance of 26 miles. It is worked in connection with the ordinary telephone lines, so that long distance messages are exchanged between Catalina and Chicago, for example.

On calm nights the range of audibility of a sound is sometimes from 10 to 20 times as great as it is during the day.

Raindrops are measured by permitting them to fall into a shallow tray containing dry flour or plaster of Paris. Each drop thus makes a cast of itself which is easily measured. The largest raindrops are about a quarter of an inch in diameter.

DO YOU KNOW THAT-

Experiments are under way to perfect a parachute which will support the weight of an aeroplane in case of accident.

Regular measurements of rainfall were made in India in the fourth century B.C. and in Palestine in the first century A.D. A rain-gauge used in Korea in the fifteenth century of our era is still extant.

Insect powder which is made by grinding the flower heads of certain species of Pyrethrum contains a volatile oil which acts upon insects by asphyxiation. It is harmless to the higher animals including man. The workmen who make it suffer no more inconvenience than do millers or others engaged in dusty trades. The plants are fed to horses and other stock after the flowers have been gathered.

It is always cold at the bottom of the sea, even under the equator. At great depths the temperature is near the freezing-point.

Most spiders spin more than one kind of silk. Seven kinds, in all, are recognized, though no one species produces all of them.



DO YOU KNOW THAT-

Ninety per cent of the coastal waters of Alaska are still uncharted.

Radium, during its disintegration into lead, gives off 300,000 times as much heat as is produced in burning the same amount of coal.

During the nearly rainless summers of South Africa the mountains in the neighborhood of Cape Town are clothed in a luxurious vegetation, supported by a copious deposit of moisture from drifting clouds.

The "crab spider" of Brazil is nearly two inches long, and its feet, when stretched out, occupy a surface of nearly a foot in diameter. This great spider is perfectly harmless.

The United States produces about  $2\frac{1}{2}$  billion pounds of sugar annually, and consumes nearly four times this amount.

DO YOU KNOW THAT-

Ten million cornets, playing fortissimo, would be needed to emit one horse-power of sound.

Several species of fungi are self-luminous. One, growing in Brazil, gives off a pale green light by night and is bright enough to be used as a night lamp.

Cotton is grown wider range of climatic conditions, over a greater area, and by a greater variety and number of people, and is useful for a larger number of purposes than any other fiber.

Certain varieties of the common lima bean are poisonous.

One of the trials of the museum curator is the fading of the colors of stuffed animals and various other kinds of museum specimens kept under glass cases. This is prevented to a slight extent by the use of the so-called "antifade" glasses.

DO YOU KNOW THAT-

Clocks for use in aeroplanes have special lubricating devices so that they will not stop when exposed to the low temperatures encountered at great altitudes.

Wind-vanes connected with a ceiling dial were known to the ancient Romans.

A great many different kinds of dust are explosive when mixed with the right proportions of air and ignited by a flame or spark. An explosion of hard rubber dust recently cost the lives of eight workmen and destroyed much property.

About 3,000 species of fossil insects are known. The most perfect specimens are found embedded in amber.

Several of next year's models of automobiles will be upholstered in shark skin leather, which is now being used in the manufacture of various fancy leather products.

RHUBARB LEAVES  
ARE POISONOUS

(By Science Service)

The rhubarb, so widely used for pies and sauces in spring contains three acids, one of which -- oxalic acid -- is very poisonous. This acid never occurs in the leaf-stalks, which are the parts usually eaten, in sufficient quantities to cause harm but it is much more abundant in the green leaf-blades, and people inclined to use the leaves as "greens" should be cautioned against the practice. The case is similar to that of the potato in which the tops are poisonous though the tubers are harmless unless exposed to the sun long enough to become green.



TASTELESS SUGARS OFFER  
NEW TYPHOID FEVER DIET

(By Science Service)

The horrors of the old starvation diet for typhoid fever patients are rapidly being done away with, thanks to newer knowledge of the requirements of the body in health and in disease, and thanks also to our knowledge of the chemistry of the sugars. The ravages of typhoid are due largely to a wasting away of the tissues, which is brought about because of two factors -- the excessive metabolism during the fever, and the once prevalent idea that food must be kept away from the patient. It has been found, however, that if plenty of food of the right kind is given there is far less wasting away and a speedier recovery. The question then arises, what is the proper food?

All fevers, and typhoid in particular, are characterized by great production of body heat, which means that the fuel requirements of the body are much greater than in health. A normal adult requires about 2500 calories per day in the food; a man at hard work about 3500; a lumberjack close to 5000. Now a typhoid fever patient has to have over 3500 calories if he is to keep up with the demands of the disease. This excessive amount of food must be easily digested, and not of a bulky nature. The two classes of food materials that furnish the greater portion of our energy are the fats and the carbohydrates. The fats are not readily assimilated in large amounts, so this fact rules them out of the present consideration. Of the carbohydrates, starch cannot be incorporated into foods in large amounts without its becoming pasty. Cane sugar is very good, except for the fact that its great sweetness makes it unpalatable after a time. So here is where our knowledge of the chemistry of the sugars makes itself useful. We know that all sugar sugars are about equally well digested; that they all have the same fuel value; and that lactose, or milk sugar, is the least sweet of all the common sugars. Therefore it needed only a few trials to demonstrate that this sugar has great possibilities in the typhoid fever diet.

The medical school of the University of Minnesota, in conjunction with the department of Home Economics, is now working out recipes which will utilize large proportions of milk sugar. Frozen dishes are very palatable, but only eight per cent of this sugar can be incorporated into these dishes, because of its sparing solubility at the low temperature. Puddings appear to offer many possibilities, and the patients do not find any amount of the sugar objectionable since it is so nearly free from taste. Fortunately, too, the cost item does not enter into the consideration, for lactose can be prepared fairly cheaply from dairy by-products, such as skim milk and buttermilk.

HAVE YOU MOSQUITO-EATING  
MINNOWS IN YOUR POND?

(By Science Service)

Is your pond properly stocked with top minnows? If it isn't look out for the malaria carrying mosquito. The gambusia or mosquito-eating minnows are recommended by the Bureau of Fisheries as an effective means of controlling the mosquitoes, and they, in cooperation with the U.S. Public Health Service, are urging that all sluggish and standing water, such as occurs in ponds, ditches and borrow pits be stocked with the top minnows which feed on the larvae of the anopholes or malaria mosquito. Hatcheries for these minnows are located in the mosquito districts

Place bowls of the minnows in the public schools and in store windows and let them advertise themselves, is the suggestion of Samuel F. Hildebrand, ichthyologist of the Bureau of Fisheries.

The British Imperial Antarctic Expedition, now in the field, is fully equipped for conducting its explorations by means of aeroplanes. It is estimated that in three flights -- 250 miles in one direction, 50 miles at right angles to it, and returning on a parallel to the outward course -- it will be possible to cover a stretch of coast that would require at least 80 days to explore with sledges.