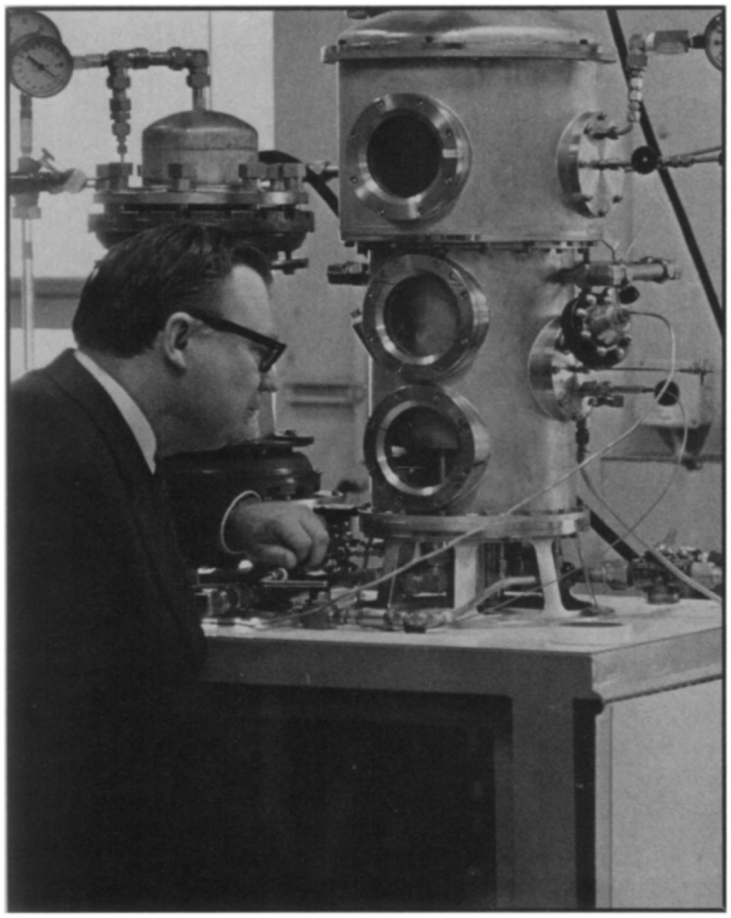
Distilling the News

by John H. Douglas

Charles R. Wilke adjusts rotofermentor, one stage of his new process to convert recycled newspapers into glucose and alcohol for fuel.



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By duplicating in the laboratory the process by which trees decay on a forest floor, a Californian chemical engineer has invented a way to produce ethyl alcohol so cheaply that it may soon be used as a fuel substitute for scarce petroleum. University of California professor Charles R. Wilke says his process is ready for immediate commercial development, using standard technology, and would also benefit the environment since ethanol is less polluting than the fuels it replaces.

Chemists have known for a long time that alcohol is a clean burning, efficient fuel. It can be used to dilute gasoline in automobiles up to 10 to 15 percent without any carburetor modification, and actually improves engine performance. But even in its commercial form, burning ethanol as a fuel has been just too expensive —like using good Scotch in an alcohol lamp.

Wilke's process may change all that. Using a natural enzyme, cellulase, derived from a culture of the common fungus *Trichoderma viride*, the procedure begins with breaking down the cellulose of almost any fibrous material —old newspapers, sugarcane stalks, sawdust—into the sugar, glucose. Next, the sugar is fermented to alcohol by action of yeast, in an industrial version of the venerable process long known to moonshiners and poets.

The difference is the price. Wilke estimates that if the cellulose were free (and most of it is being thrown away now) glucose could be produced for 1¢ a pound, compared to a present market value of over 13¢ a pound. That, in turn, leads to a price for alcohol of 30¢ a gallon, one-half the theoretical market value and more like a quarter of its actual industrial price.

Americans produce a pound of waste paper per capita every day. If just the readily available waste cellulose is converted to alcohol, the energy then available by using the product as a fuel would equal 10 percent of annual U.S. gasoline production. If the idea really catches on, agricultural wastes could be added and fast growing plants could then be raised for their cellulose, which, at $20 a ton, would boost the cost of the alcohol 12¢.

Today, most commercial ethyl alcohol is produced from ethylene, one of the "high distillates" produced in refining petroleum. But ethylene is also the basic raw material for many plastics and as oil has come into short supply, prices have skyrocketed. Should cheap production of ethanol from cellulose became a reality, the current procedure could be reversed with alcohol turned into distillates to make plastic.

Wilke hopes to reduce the price of producing the alcohol even more, by finding more efficient ways to convert glucose. The initial process of artificially decaying wood is already quite efficient and includes recycling most of the active enzyme. (The strain of fungus used to produce the enzyme was bred by the army during experiments related to the rotting of tents.)

In addition to alcohol, abundant cheap glucose might also make synthetic proteins competitive. Produced by the action of certain bacteria and yeast on glucose, such proteins would probably first be used in animal feed, freeing regular crops to help meet the growing worldwide food shortage.

Because of Wilke's association with the Lawrence Berkeley Laboratory, the Atomic Energy Commission has first patent rights to the new process, followed by the University of California. No one is sure when commercial production will begin, but Wilke sees no major technical barriers blocking the way. Thus, given the interest of some industrial Bacchus, Americans may soon find new uses for an old, familiar substance. □