

# NEWS

## From GEORGIA TECH'S ENGINEERING EXPERIMENT STATION

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UNIQUE BACTERIA COULD PRODUCE  
PETROLEUM CHEMICAL SUBSTITUTE

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ATLANTA, Ga. — Bacteria farms someday may shorten the work of nature by centuries and produce chemicals which can be used like petroleum in industry.

A Georgia Tech biologist says that a unique strain of bacteria routinely makes hydrocarbon compounds whose chemical structures are strikingly like those found in fossil fuels.

These "archaebacteria," as scientists call them, have been found widely distributed in nature. Many of them show remarkable resistance to harsh environmental conditions like those believed to have prevailed on earth when the world's petroleum reserves were being created.

Dr. Thomas G. Tornabene, director of Georgia Tech's School of Applied Biology, believes that they could have been the primary agents responsible for converting plant and animal matter to oil.

"Scientists really have never known how fossil fuels were formed," he says. "It's been postulated that physical forces such as pressure and heat caused the conversion over thousands of years. The discovery of archaebacteria has given us the first concrete evidence that petroleum may have been created biologically."

Tornabene has worked with archaebacteria for the last three years and says they are distinctly different from other life forms on earth. He calls these microorganisms "the third form of life." Traditionally, scientists have divided life into two categories: organisms with sophisticated cell structures (plants and animals) and organisms with less complex cell

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makeup (bacteria). Archaeobacteria fit into neither class because of basic differences in genetic character, chemical composition and the unusual type of fatty materials which they are constantly generating. These fats are similar to hydrocarbon compounds found in fossil fuels.

Archaeobacteria also survive and even thrive in environments which researchers previously thought were unable to support life. Tornabene says he has seen microorganisms of this type which live in boiling acid solutions, concentrated salt solutions and airless environments.

His findings have stimulated the interest of scientists who are searching for evolutionary biochemical mechanisms. However, the main thrust of this research involves energy. Tornabene has received a grant from the Department of Energy and the Solar Energy Research Institute to search for bacterial "weeds," species of microorganisms which are both sturdy and profuse in nature. These archaeobacteria would be prime candidates for making petroleum substitutes.

"We're not talking about a solution for the energy crisis," warns Tornabene. "It wouldn't be practical to believe we could ever 'grow' enough fuel to run our cars or to heat our homes. But we think archaeobacterial 'weeds' could provide a workable substitute for petroleum-based chemicals such as those used now to make paints, lubricants, emulsifiers, antibiotics and a wealth of other valuable products."

The challenge of this research effort is modifying archaeobacteria so that they produce enough hydrocarbon compounds for industrial application. In nature, they make only minute quantities of these chemicals. Archaeobacterial species, which Tornabene and other colleagues have isolated, generate hydrocarbons which are in a range from 0.5 percent to 14 percent of their respective body weights. A microorganism which made 80 percent of its weight in hydrocarbons would be ideal.

To reach this goal, however, will require genetic manipulation of still unfound archaeobacteria.

"Genetic alteration of bacteria is commonplace in industry today," says Tornabene. "But the work we're talking about is on the frontier of biotechnology. We're looking for the right microorganism to alter. We could find it in a month or we may never find it. The time frame is unpredictable but if we can discover a good candidate, industrial production won't be far away."

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