

Quincy

world just views these loners as eccentric. But history is filled with unlikely, often unschooled and self-taught, eccentrics who make all the difference.

Violinmaker Carleen Hutchins was one such pioneer.

Marshall Medoff, 81-years-young, is another. A business man, who is obsessed with climate change, simply taught himself to be a scientist by observing and thinking, absolutely convinced that he was going to stop global warming. Following in the footsteps of Thoreau, Medoff sequestered himself at Walden Pond to observe and listen to nature.

His first conclusion was this: "What I thought was, the reason people were failing is they were trying to overcome nature instead of working with it." And so Medoff listened and observed—lots of thinking about trees and leaves. He knew that plants held the key, that there was lots of energy in plant life. This energy is in the form of sugar molecules called cellulose. While theoretically, this energy might be converted into transportation fuel, no one had figured out how to access it, as it is packed tightly inside the cellulose, which is the main part of the plant's cellular walls. What was so exciting was

that cellulose is the most abundant biological material on Earth.

Given his lack of training and inexperience, Medoff took on a mission that was nothing less than impossible – to solve the problem that had baffled scientists for decades – how to transform inedible plant life into environmentally friendly fuel.

To find the solution, Medoff left his life behind for 15 years, secluding himself 24/7, from 9 a.m. until 9 p.m., in a garage facility in the middle of nowhere with no contact from the outside world – not even a phone, so no one could disturb him.

What gave him the chutzpah to think he could figure anything out?

Medoff: "Apparently, I must have had a very good mother who breastfed me an extra few months or something because I had a lot of security about the fact that I'd get it done. And I never had any doubts."

Alone in that garage, Medoff began reading everything he could find on the topic, and began generating ideas and then patenting them. After 10 years, he knew he needed help and hired Craig Masterman, an Massachusetts Institute of Technology graduate in chemistry to build him a lab.

Up until now, scientists were using sulfuric acid and steam explosion to try and extract sugar from plants, but that approach was laborious and expensive. Medoff turned to

machines called electron accelerators, basically accelerated electricity, machines typically used to strengthen wiring and cable. Medoff turned in the opposite direction. Why not use these electron accelerators to break things apart, to break down the cellulose, the sugar or "biomass," inside the plant?

The idea sounds supremely simple. Masterman, in his interview with Lesley Stahl on 60 Minutes, said: "I think, fantastic stuff is simple in hindsight."

Investors, sparked by Medoff's innovative use of accelerators gave Medoff and his company, Xyleco, hundreds of millions of dollars, enabling him to build a factory in Moses Lake, Washington. This factory is scheduled to be operating by spring.

Medoff's recipe is simple and proprietary. Agricultural residue, such as corn cobs, transported from local farms, is ground up and then blasted by the electron accelerator, then combined with a patented enzyme mixture. This process releases plant sugars for a variety of products developed by Medoff.

One such sugar which Medoff calls Xylose is actually "wood sugar," a low-calorie, consumable sweetener that the oral bacteria in the mouth cannot use, so this sweetener will not decay the teeth.

Sponsored by his investors, Medoff soon opened his second facility, a \$45 million testing laboratory in Wakefield, Mas-

sachusetts, where he has hired 70 scientists and engineers, who have invented another sugar-based product that could take on the plastic debris epidemic. While most plastics are produced with petroleum, Medoff's plastic comes from plants. It looks the same but differs in one drastic way. According to David Jablonski, a chemical engineer, the bio-plastic created by Xyleco "can be programmed to disintegrate over specific time spans, ranging from years to as quickly as 11 weeks."

But by far, the most revolutionary invention with the most far-reaching consequences, is the fact that Medoff has figured out how to extract plant sugar and convert it to green, environmentally-safe biofuels, ethanol, gasoline and jet fuel, that has proved to perform 77 percent better than corn ethanol. When you watch the 60 Minutes video, Medoff stands next to a machine he proudly points to as his "still."

Medoff: "It's actually making alcohol right now. Alcohol that you can drink, or you can put in our car, or you can do both."

This unlikely businessman-turned-scientist now has the attention of Robert Armstrong, the former head of MIT's chemical engineering department. Armstrong was so impressed with Medoff's innovative use of the electron beam accelerator, he joined the board of directors for Xyleco.

Armstrong said of Medoff:

"He outsmarted MIT and now he's lured some pretty powerful men to his board of directors, including former Shell Oil executive Sir John Jennings, and three former cabinet secretaries, Steve Chu of the Department of Energy, George Shultz, former secretary of state and former defense secretary, William Perry."

When asked about how Medoff managed to reach the Holy Grail in plant sugar fuel, Dr. Steven Chu observed: "He has all the attributes to many successful scientists. You have to believe in yourself. You have to say, 'This is going to work.'"

How quickly can Xyleco make a difference in the ethanol/gasoline use on the planet? While it can take some time to break apart huge industrial markets and established companies, one obvious and huge impact is the fact that Xyleco fuel can be easily pumped into existing gas station pumps right now, without any changes whatsoever.

Wood sugar, naturally disintegrating bio-plastic bags, and green gasoline – Medoff hit the target by looking at leaves on Walden Pond.

Chutzpah is defined as "presumption plus arrogance." And so it is. And the world is better for it!

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