Nothing Withheld!

Electric Cars
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It was the evening of September 13, 1899, when 69-year-old Henry H. Bliss stepped from a trolley car along New York's Central Park, was hit by a taxi cab, and died the next morning from injuries. He was courteously helping a lady friend off the trolley when he was run down

"Fatally hurt by automobile," *The New York Times* story read, seizing on gruesome details such as "crushed" skull and chest, and gossipy ones such as the fact that the taxi's passenger was David Edson, the son of a former mayor. Edson also happened to be a doctor returning from a sick call, and performed triage to Bliss on the scene. The driver was arrested and jailed but later acquitted.

The story makes the history books because Bliss was the first fatal car accident victim, pedestrian or otherwise, in North America. But the most surprising detail, in hindsight, was not even noteworthy enough to make the newspaper account: the car was electric. That's right! An electric car in 1899.

In the late 1800s, electric-powered cars were among the highest performing and most popular vehicles on the road. In 1900, there were more electric cars in New York City than gasoline-powered ones, and for good reason. They were less smelly and quieter than their fuel-burning counterparts, didn't require a hand-crank start, and they eliminated the hardest part of early driving: shifting gears.

The fleet of taxis that ultimately were the death of Bliss were built by the Electric Vehicle Company, an enterprise that was eventually done in by the difficulty of maintaining infrastructure for charging the batteries.

For years, the Electric Vehicle Company cleverly swapped out old batteries for fresh ones at the end of a taxi's shift, but as the fleet grew, it became harder to maintain and organize the battery facilities. Mainly because the

company failed to properly scale its success, it went bankrupt in 1907, a 100-plus year setback for electric passenger vehicles.

Fast forward to today. Visit a super-wealthy enclave in California, like La Jolla, or a super-techy one, like Mountain View, and you will get a glimpse of the future. The car future, that is. Every second car on the road is a Tesla, Nissan Leaf, Toyota Prius, or something similar. The electric and hybrid vehicles interweave perfectly with the regular traffic, and many businesses, shopping centers, and homes have charging points installed. If the electric car-makers have their way, this is the future that we will all experience at some point, and they are pouring a lot of money into making it happen.

The question is, how easy is it to scale up the demands of small enclaves to an entire country?

Elsewhere in California, Elon Musk's Tesla Motors is building an enormous battery factory in the southwestern United States. This so-called "Gigafactory" costs at least $5 billion, and will produce lithium-ion batteries.

This year, Tesla will be doubling the Tesla charging network, expanding existing sites so drivers never wait to charge, and broadening their charging locations within city centers. 2017 started with over 5,000 Superchargers globally, and by the end of this year, Tesla will double that number to total more than 10,000 Superchargers and 15,000 Destination Charging connectors around the world.

But some people think Tesla's plan will be out of date by the time the factory is fully operational. Phil Gott, the senior planning director at IHS Automotive, believes Tesla's ambitious plan is "probably premature." New technologies are being developed that could offer better alternatives to address what experts say is one of the biggest limiting factors for electric vehicles.

The problem these cars face is that batteries are big and heavy, and as a consequence only a limited number can be installed. The Tesla Model S, for example, has a battery pack about 6.6 feet long by 4 feet wide, which is installed flat along the floor of the car. The top-spec Tesla car has a range of about 300 miles (482km) before plugging in and recharging is required. The

Nissan Leaf achieves more like 80 miles (128km). On top of that, charging is a much slower process than just filling up with gasoline.

So, the question remains: How can you make a better battery? That is the whole issue for electric cars. It has plagued them ever since the first one back in 1899. At its most basic, a battery contains a positive and negative electrode, a separator and an electrolyte. (This is the point when the eyes of all the ladies glaze over.) Many different types of materials can be used as electrodes. The different combinations of materials allowing different amounts of energy to be stored.

However, battery life and the safety characteristics change as the materials change, so a compromise is always necessary. Lithium-ion batteries are popular, but have been implicated in fires onboard planes, and their transport is restricted. Anything more reactive or unstable could be a hazard.

The latest efforts follow a long line of improvements over the decades.

First, we had lead-acid batteries, the type that is still commonly used in cars. They are huge, as we all know, and heavy.

Then, you might remember NiCad (nickel-cadmium) batteries. They were the rechargeable batteries that heralded a new era of portable technology in laptops, phones, and the like, as well as the remote-control cars of childhood.

Then came NiMH (nickel metal hydride) batteries, with about twice the capacity or energy density.

Now, modern devices and electric cars are powered by lithium ion, or Li-ion, batteries.

Going forward, battery technology will have increasingly complicated names: LiNiMnCo (lithium-nickel-manganese-cobalt-oxides), for example.

These materials have complex properties, and work is now going on to figure out not only WHY these materials work, but also exactly HOW they work—the basic physics of the electrons moving around the materials.

Daniel Abraham, a material scientist at Argonne National Laboratory, outside Chicago, says:

> There are materials we are working on at Argonne which can double the current energy density available for batteries . . .. We dream up or imagine the types of materials we would like to work with, then we attempt to synthesize the materials in the laboratory.

It's ironic that these scientists often deny the very God who gave them the ability to dream up or imagine such things that none of us would ever think of.

Currently, the batteries getting all the attention are: lithium-air, or more properly lithium-oxygen, as well as lithium-sulphur batteries. Li-oxygen batteries, if they can be made to work under all conditions, will be of tremendous improvement over the current Li-ion batteries.

Volkswagen says they hope to get triple battery capacity out of lithium-air batteries. The precise chemical/material combination that they are using has not been revealed as development work continues. The company's engineers will not even say if the technology has been tested in a car, or if it is still at the 'lab bench' stage.

But although the technology has revolutionary potential, the technical challenges of making a Li-air battery work consistently, reliably, and safely—and crucially, for extended durations—are large. So far, the electrodes have proven unstable. Labs around the world are working on the problem though, trying to overcome the drawbacks. The hope is that greater emphasis on these "beyond lithium-ion" technologies will ensure faster progress in their development, and in the long-run, faster cars that travel farther.

It is truly amazing what humans are able to invent and build. This is just one small area. This electric car technology gives you a mere inkling of what mankind is capable of (in one area that may have a tremendous impact on our technological future), when using the wonderfully made God-given human brain to invent and construct whatever we can imagine.

Try to imagine what pre-Flood people were able to think up while living many hundreds of years. It was not long after the Flood that people were able to build the tower of Babel, which would have required advanced knowledge in mathematics, engineering, architecture, and construction.

Speaking of man's misuse of knowledge in the construction of the Tower of Babel under Nimrod, the Eternal said,

> **Genesis 11:6** …Indeed the people are one and they all have one language, and this is what they begin to do; now nothing that they propose to do will be withheld from them.

We can certainly see that in this age, in this last age of mankind, in that man does not have anything withheld from him. He is interfering with genetics and all types of things that God has created. Whether it is going to the bottom of the ocean, progresses in driving on land or traveling to Mars, humanity's technological advancements will not solve the basic problems plaguing people on a daily basis because of rampant, flagrant sin. They have become "futile in their thoughts, and their foolish hearts are darkened. Professing to be wise, they became fools," because they did not retain God in their knowledge.