

LETTERS FROM GRANDPA
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Dearest grandchild,

Today's letter will again feature Dr. James Tour. I wrote to you about him recently, emphasizing that he is a scientist who spends a couple of hours every day studying the Bible. While you may not spend that much time in Bible study, I pray that his example will inspire you to at least spend some time every day studying the Word of God. Today let us focus on his research in nanotechnology. Dr. Tour has done research in many areas of this science including nanoelectronics and carbon nanovectors. He has even created an interactive DVD game for kids involving "nanocars" and "nanokids" to improve their fundamentals in chemistry and physics.

If you Google "nanocar" Dr. Tour's name pops up. When asked to explain what a "nanocar" is Dr. Tour said: "So, a nanocar is a single molecule. It has a chassis, axles, wheels, and motor. And you build it such that it's all based upon the building up of single molecules. You can park about 50,000 of them across the diameter of a human hair. So they're very small. We make about a billion, billion of them at a time. And they had the first nanocar race this summer in Toulouse, France. And we won." The Rice University News, where Dr. Tour teaches, confirmed this win on April 28, 2017: "The Rice and University of Graz team finished first in the inaugural Nanocar Race in Toulouse, France, April 28, completing a 150-nanometer course — a thousandth of the width of a human hair— in about 1½ hours. (The race was declared over after 30 hours)"

Wikipedia explains that the Nanocar Race is an international scientific competition with the aim of testing the performance of molecular machines and the scientific instruments used to control them. The track of the first competition is a gold surface, equipped with grooves to define race lanes in order to avoid losing vehicles. It is about 100 nanometres long, and includes two bends. It is located in a small enclosure cooled to -269°C under a primary vacuum of 10⁻¹⁰ mbar and is observed simultaneously by four scanning tunneling microscopes miniaturized for this event and operating on the same surface. Each microscope is responsible for driving a single vehicle (a single nanocar). During this competition, the nanocars should move as far as possible on the gold track during the 36 hours race. Speeds of 5 nanometers per hour were expected . . . The nanocar is propelled step by step by electrical impulses and electron transfer from the tip of the STM. The resulting tunnel current flows through the nanocar between the tip of the microscope and the common metal track. There is no direct mechanical contact with the tip. The nanocar is therefore neither pushed nor deformed by the tip of the microscope during the race. Some of the electrons that pass through the nanocar release energy as small intramolecular vibrations that activate the nanocar's motor.

As you know, Charles Darwin published his Origin of Species Nov. 24, 1859. He didn't worry about the origin of life for at that time science had no way of knowing how complex the "simple cell" actually was. The invention of the scanning tunneling microscope in 1981 provided a major breakthrough in this regard. Until the early 19th century many people believed in the regular spontaneous generation of life from non-living matter. This "spontaneous generation", as you know, was disproved by Louis Pasteur. Pasteur showed that without spores no bacteria or viruses grew on sterile material. Darwin had speculated in a letter to Joseph Dalton Hooker on Feb. 11, 1871 that life "may" have begun "in a warm little pond with all sorts of ammonia and phosphoric salts, light, heat, electricity, etc." To date, however, no one has explained the spontaneous generation of life. To date the only life we know about comes from other life. To date there is no scientific evidence supporting the spontaneous generation of life.

Modern science has provided insight into how much of our universe is incredibly small. As I recall, scientist John Lennox observed that the size of man is about half way between the size of an atom and the size of the universe. David Cloud provided further insight into the microscopic world by writing on July 12, 2017: *“The flagellum motor is composed of a propeller, drive shaft, stator, bushing, u-joint, and is powered by the flow of hydrogen ions. It can rotate at 6,000 to 17,000 rpm but usually operates at 200 to 1000 rpm. It can change speeds and reverse direction in a quarter of a turn. Using this amazing biological motor, the bacteria can propel itself at speeds up to 15 cell lengths per second, which is equivalent to a car traveling 150 miles per hour. Each shaft rotates a bundle of whiplike flagella that acts as a propeller. Scientists working with ultra-micro devices have learned that the flagella’s whiplike propeller, which at first glance looks awkward and inefficient, is actually perfectly right for propelling a very tiny object through a liquid environment. (See “Making Stuff: Smaller,” NOVA, PBS, 2011.) “The bacteria can stop, start, and change speed, direction, and even the ‘propeller’s’ shape. They also have intricate sensors, switches, control mechanisms, and a short-term memory” (Brown, In the Beginning, p. 19). Eight million of the bacterial motors could fit inside the circular cross section of a human hair.”*

If God can monitor motors so small that eight million can fit inside the cross section of a human hair, He certainly will have no trouble keeping track of you! What are you doing to keep track of Him?

I love you,

Grandpa Boyce