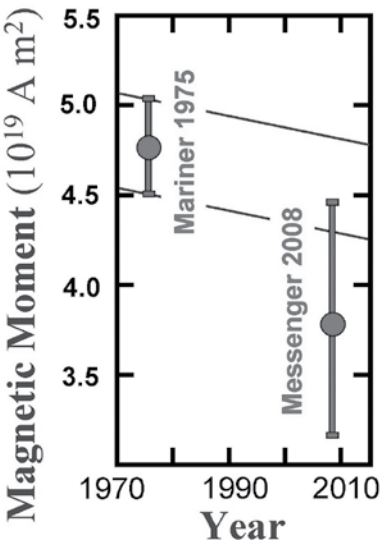

Figure 3. Spacecraft measurements of Mercury's magnetic field strength.

4% decrease in only 33 years would be very hard for evolutionary theories of planetary magnetic fields to explain, but a greater decrease would be even harder on the theories. That might be one reason the Messenger team seems reluctant to admit a decrease has occurred. Their paper confuses the issue by comparing different types of analysis with each other, like comparing apples with oranges. But in figure 3, which uses a single type of analysis (comparing apples with apples), the lack of overlap of the two error bars with each other (a horizontal line at about 4.5×10^{19} A m^2 can separate them) makes it statistically likely that a decrease has indeed occurred.

When Messenger makes more flybys and then goes into orbit around Mercury, we should get more accurate results. But the first results seem clear enough for us to expect good agreement with the creationist model. None of the now-verified predictions of the model could work without the biblically-specified original created material of planets and the biblically-specified age of the solar system, 6000 years. When NASA's space program began many decades ago, nobody expected it to vindicate Scripture so strongly.

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Germ's miniature motor has a clutch

Jonathan Sarfati

Bacterial flagellum: powered by an electric motor

Many bacteria are powered by real electrical outboard motors, only 45 nm in diameter.[1] These motors connect to long, thin, whip-like helical filaments several times as long as the germ, via a universal joint. This converts the rotary motion of the motor into wavelike motions in the filament. The motor comprises a stator, rotor, drive shaft and bushing that guides the driveshaft out through the cell wall. 'The assemblage of motor and filament is called a *flagellum*.'[1] Bacteria often have several flagella, and their concerted motion enables the cell to swim at 35 cell lengths per second.[1]

While our electrical motors are powered by a negatively charged current (electron flow in wires), the flagellar motor is powered by positively charged current. This is a flow of hydrogen ions (protons, H^+), from the outside to the inside of the cell (except for marine bacteria and bacteria that live in very alkaline conditions (i.e. low concentration of H^+), where sodium ions (Na^+) are used instead). The proton movement is driven by either an electrical or pH gradient, and the energy to generate this gradient comes from the oxidation of its food. The proton flow changes the shape of one of the stator proteins, which exerts a force on one of the rotor proteins, thereby driving the rotor.[1] A recent article said:

> 'The flagellum is one of nature's smallest and most powerful motors—ones like those produced by *B. subtilis* can rotate more than 200 times per second, driven by 1,400 piconewton-nanometers of torque. That's quite a bit of (miniature) horsepower for a machine whose width stretches only a few dozen nanometers.'[2]

A clutch

This same article reported on another astounding discovery: that this motor even has a clutch to disconnect the motor from the filament. Scientists from Indiana University Bloomington (IU) and Harvard University actually discovered this by accident when researching biofilms.[3]

These are slimy sheets a fraction of a millimetre thick that form on any surface that has a supply of nutrients and water, including teeth and pipes.[4]

IU biologist Daniel Kearns, the project leader, explains:

> 'We were trying to get at how the bacterium's ability to move and biofilm formation are balanced. We were looking for the genes that affected whether the cells are mobile or stationary. Although *B. subtilis* is harmless, biofilms are often associated with infections by pathogenic bacteria. Understanding biofilm formation may eventually prove useful in combating bacterial infections.'[2,5]

That is, the fast and furious motions of the bacteria might disrupt the formation of biofilms, so the bacteria need some means of stopping it quickly. The researchers discovered that a protein called EpsE was responsible somehow. But how did it work? There were two possibilities: one possibility is a brake, locking up the motor so preventing it spinning; another is simply to disconnect the motor from the filament, just as a clutch in a car disconnects the drive wheels from the engine.

To decide between these options, the researchers attached the filaments to a glass slide, and observed the bacterium. The flagellar motor was powerful enough to turn the entire germ once every five seconds, without EpsE. If EpsE were a brake, then the bacterium would also be unable to turn, like the wheels on a braked car; if it were a clutch, then the bacteria would be free to rotate if powered by another source, like the wheels of a car coasting down a hill on 'neutral', powered by gravity. It turned out that the bacteria with the protein present could indeed rotate passively, powered by the random collisions of molecules (Brownian motion[6]). In other words the filament freewheels.

This molecular clutch, EpsE, is thought to dock on the flagellum's rotor, a donut-shaped structure at the base of the flagellum. There, EpsE interacts with one of the rotor proteins, called FliG, which changes the rotor's shape so that it disengages from the engine. Or as described in the perspective:

> 'Motile cells are powered by interaction of the FliG protein with the MotA/B complex (which generates torque). The protein EpsE acts as a molecular clutch to disengage the rotary flagellar motor, leaving the flagellum intact

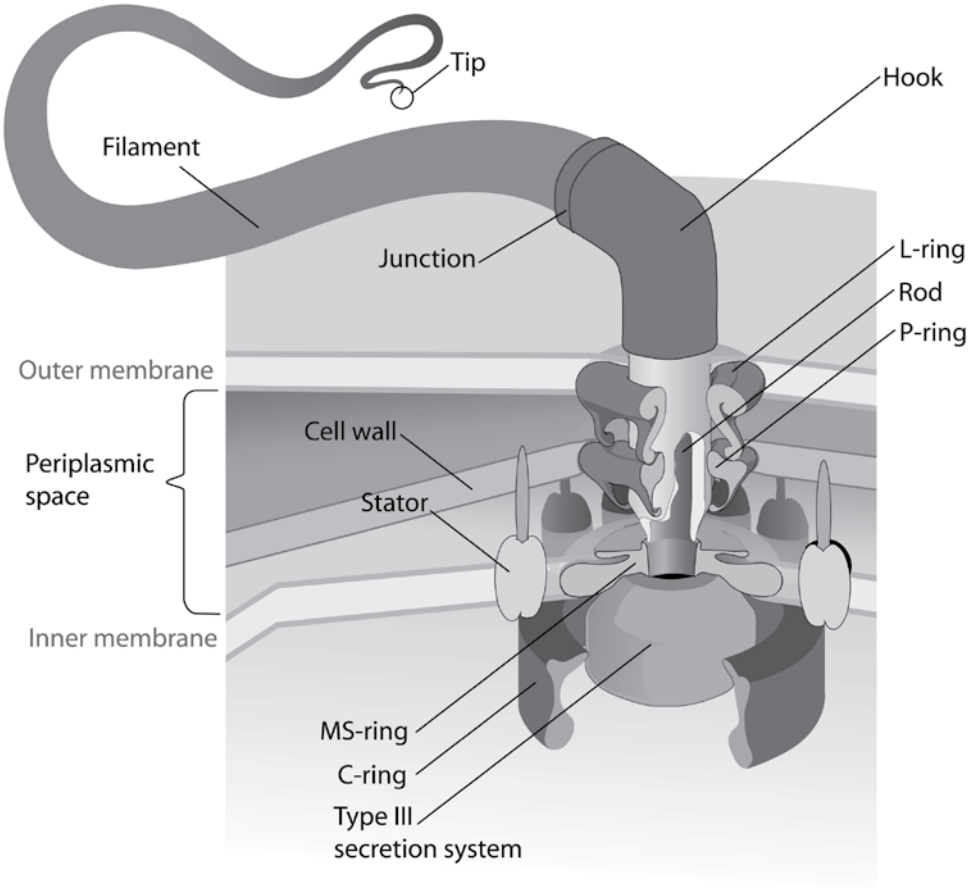

Illustration <Wikipedia >

Figure 1. The bacterial flagellum (with rotary motor) has many features which people recognize as design features, such as a clutch.

While human engineers solved the problem: 'How do you temporarily stop a motor once it gets going?' The Designer of the bacterial flagellum had anticipated that solution with a clutch.

but unpowered. This shuts down motility and facilitates biofilm formation.'[4]

This clutch mechanism is very efficient: it means that the germ needs to make only one protein to halt the powered filament motion, and this takes only 15 minutes. It also preserves the motor intact, so it could reactivate if necessary, rather than needing to be rebuilt from scratch. There also may be an advantage to building biofilms if the filaments were free to rotate in neutral rather than stopped rigidly.[4]

Design or evolution?

While human engineers solved the problem: 'How do you temporarily stop a motor once it gets going?' The Designer of the bacterial flagellum had anticipated that solution with a clutch.

Project leader Daniel Kearns made the obligatory vacuous homage to evolution:[7]

'We think it's pretty cool that evolving bacteria and human engineers arrived at a similar solution to the same problem: How do you temporarily stop a motor once it gets going?'[2]

It would make more sense to say: 'We think it's pretty cool that human engineers solved the problem: "How do you temporarily stop a motor once it gets going?" with a clutch, while the Designer of the bacterial flagellum had anticipated that solution.'

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Another attempt to calibrate Ar–Ar dating methods

Barry Tapp

An international team of scientists have attempted to define a better calibration of the geologic timescale by comparing radioisotopic and astronomical dating of tephras in marine deposits from Morocco.[1] Using $^{40}Ar/^{39}Ar$ age definition of these tephras the authors seek to recalibrate the age of the Fish Creek sanidine which is the most widely used standard in argon-argon dating. They claim to reduce the uncertainty in argon-argon dating from about 2.5% to 0.25%.

The potassium–argon (K–Ar) and argon–argon (Ar–Ar) methods are widely used for radiometric dating and have become crucial in calibrating the geologic timescale. The idea is that since ^{40}Ar is inert and does not combine chemically with any other element it is assumed that any initial quantities of ^{40}Ar contained within the magma (molten rock) will easily escape before the magma crystalizes. This allows geochronologists to make plausible assumptions about the initial concentration of the ^{40}Ar daughter isotope, without which it is impossible to calculate an age. In other words, they assume the initial concentration of ^{40}Ar is zero.

It is impossible to know whether this assumption is correct. Any daughter product present at the time of formation in a sample is effectively a contaminant and distorts the resulting age determination. Any argon that did not escape but remained trapped within the rock when it solidified is called 'excess argon' but it is impossible to distinguish excess argon from radiogenic argon, since they are both the same isotope. The only way of checking is to compare the calculated age with the true age of the rock. If the calculated age is higher than the true age it is concluded that the sample contained excess argon. But how do scientists know the true age?