Intelligent Design and Evolution Awareness Center

FAQ:
Aren't "biological machines" too different from human-made machines to be considered examples of designed machines?

The Short Answer: No, biological machines provide a good analogy to human designed machines for us to consider both designed.

The Long Answer:
From physics, the definition of work is W=F*d (F=force, d=distance). Based on this understanding, the bacterial flagellum as well as cilia perform work: they exert a force and thereby provide mobility. In the literal sense of the word, these are machines: they exert a force over a distance, which is work. Additionally, these machines have many specialized parts that are will integrated with each other, all of which are required to perform the function of mobility (this gets at the idea of irreducible complexity). This is very much in line with the concept of a machine. Therefore, we suggest that these are true examples of machines in biology and not just mere collections of molecules. These function exactly as man-made machines.

It should also be noted that intelligent design theorists are not the only ones who see 'machine' analogies in the microbiological realm. The bacterial flagellum and the rotary engine provide an excellent comparison of a human-designed machine and a designed machine in biology. As one researcher wrote, "More so than other motors, the flagellum resembles a machine designed by a human" (David J. DeRosier, *Cell* 93, 17 (1998)). The mainstream literature is rife with references to "molecular machines," (visit the PubMed Search Engine (http://www.ncbi.nih.gov/entrez/query.fcgi) and search for "molecular machines") and rotary motor enthusiasts, unrelated to intelligent design, have found that "Nature Always Does it First" (http://www.monito.com/wankel/alteralter.html) because of the similarities between the bacterial flagellum and the non-Wankel rotary engine.

The intricacy of the bacterial flagellum dispels any notions that they are not like carefully designed machines:

> "The eukaryotic flagellum is a complex biochemical machine that moves cells or moves materials over the surface of cells, such as in the mammalian esophagus, oviduct or in protozoa. It is composed of over 250 polypeptides that must be assembled into a number of different structures and each structure must be attached with an exact periodicity along the microtubules. Once the flagellum is assembled, each of the components must act in concert and in three dimensions to produce a complex waveform. This review provides an outline of the composition and function of the different structures found in the flagella of Chlamydomonas."
>
> (Susan Dutcher, "Flagellar assembly in two hundred and fifty easy-to-follow steps" *Trends in Genetics* Volume 11, Issue 10)