Mechanical Metaphors in *Unlocking The Mystery of Life*

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Abstract: In the Aristotelian heritage of modern science, matter was lively. Yet with the acceptance of "mechanical philosophy" during the Enlightenment, this animistic view of matter came to an end. Concerned with the religious implications of this de-spiritualization of matter, religious mechanical philosophers such as Robert Boyle and Isaac Newton attempted but ultimately failed to find a role for God in a mechanistic universe. In order to provide evidence for the existence of God, the Intelligent Design video *Unlocking the Mystery of Life* (Meyer & Allen 2002) adopts a mechanistic view of cellular biology, similar in many ways to the mechanistic viewpoint promoted by Rene´ Descartes. I conclude with an examination of the apparent incompatibility of this mechanistic viewpoint with American fundamentalism.

Creationists find a receptive audience in the United States. Nearly half of Americans reject the theory of evolution, and more than half reject human evolution (CBS News 2005; The Pew Forum on Religion & Public Life 2005). In recent decades, at least four major creationist organizations have arisen to support and exploit these sentiments, largely through print media and video production (Answers in Genesis 2006; Creation Research Society 2006; Discovery Institute Center for Science & Culture 2006; Institute for Creation Research 2006). *Unlocking the Mystery of Life* (Meyer & Allen 2002) is a particularly popular and successful creationist video. The first production of Illustra Media, an affiliate of the Discovery Institute's Center for Science and Culture (2006), *Unlocking the Mystery of Life* (hereafter UMOL) mounts a biological version of the 'Intelligent Design' argument (hereafter ID), namely that various cellular structures and processes are 'irreducibly complex', i. e. they could not have evolved through natural selection. UMOL is well written, superbly animated, accompanied by a first-rate orchestral score, and very popular. According to the Discovery Institute (2006), UMOL has aired on Public Broadcast System stations in ten states, and as of June 2006, over 136,000 copies had been produced in DVD or VHS (Ray 2006). Because of its use in Sunday school classes, each copy is typically seen by numerous people, and Illustra has organized the material into a

special classroom version to encourage use in educational settings (Meyer & Allen 2004). Thus a substantial proportion of U. S. science students have seen UMOL or are familiar with its arguments. As we shall see, these arguments have an interesting historical antecedent.

The Scientific Revolution and the De-spiritualization of matter

With the notable exception of atomists such as Democritus and Epicurus, ancient Greek thinkers generally took an animistic view of the world. Not just humans, but animals, plants and rocks all possessed souls and acted with intention. In the Aristotelian world picture, for example, a dropped stone did not fall because of an external force, but because it actively sought its natural place, the center of the world. Similarly the Aristotelian celestial sphere was not turned by outside forces, but moved out of love for the Prime Mover (Dijksterhuis 1961, p. 35). As the Greek heritage, and particularly the work of Aristotle, was gradually rediscovered and adopted during the European Middle Ages, this animistic inclination pervaded European natural philosophy. Even as late as the 17th century a careful empirical investigator such as William Gilbert could explain the earth's rotation as a wise response of the earth's soul to the need to prevent scorching on one side and freezing on the other, or describe magnetism in terms of sexual attraction (Westfall 1971, p. 27). Yet as the scientific revolution of the 16th and 17th centuries progressed, mechanical metaphors gradually replaced animistic metaphors.

Rene´ Descartes was particularly influential in the mechanization of the world and the elimination of 'occult qualities' from matter. Descartes promoted a 'mechanical philosophy' by which all physical phenomena are caused by direct contact between corpuscles. Where Gilbert postulated lively souls in magnets, Descartes postulated tiny screw-shaped particles whose turning motion draws magnets together (Westfall 1971, pp. 36-37). Even living things were

machines for Descartes. Humans were distinct from animals in possessing a soul, but such a soul was inessential to the living body:

> [I]f the body of man be considered as a kind of machine, so made up and composed of bones, nerves, muscles, veins, blood, and skin, that although there were in it no mind, it would still exhibit the same motions which it at present manifests involuntarily, and therefore without the aid of the mind . . . (Descartes 1641, part VI, section 17)

The mind inhabits the human body, but the mind is not what keeps it alive. God performs a soul implant at birth and a soulechtomy at death (Peters 2000), and between birth and death, to adopt Gilbert Ryle's (1984/1949) wry phrase, a Cartesian person is a 'ghost in a machine.' Since Descartes, this view of humanity has been taken for granted in the Western world.

Religiously observant mechanical philosophers of the 17th century recognized a danger in such a 'mechanization of the world picture', namely that following the act of creation, God would become irrelevant. Thus like Descartes before him, devout Christian Robert Boyle credited God with imparting the human soul at birth and with preventing the world from degrading to chaos through his 'general concourse.' (Burtt 1932, pp. 191-195). Isaac Newton credited God with preventing the fixed stars from gravitationally collapsing into one another, occasionally restoring the motions of the planets and comets as they were apt to go awry, and restoring the motions of atoms following their (inelastic) collisions (Burtt 1932, pp. 191-193; Scott 1970). But other mechanical philosophers recognized that the roles assigned to God by Newton and Boyle were of an ad-hoc, inessential nature. Gottfried Leibniz, for example, criticized the restorative functions assigned to God by Newton, noting that God must be a poor craftsman if he must 'wind up his watch from time to time' or periodically intervene to correct defects in the solar system (Ribas 2003). Similarly Pierre-Simon LaPlace demonstrated that all of the planetary irregularities which concerned Newton were periodical (Burtt 1932, p. 295), leading to the legend that LaPlace claimed to 'have no need for the God hypothesis.' With the

rise of the theory of evolution by natural selection in the 19th century, the mechanical philosophy was extended even to the generation of new species (Greene 1959), so eventually no science had need of the God hypothesis.

The Mechanized World of UMOL

Paradoxically, UMOL embraces a mechanistic philosophy in order to reinstate the God hypothesis. UMOL's central argument is that certain cellular structures and processes could not have evolved, so a designer must have created them all at once as complete structures. Although this designer remains unnamed, the Judeo-Christian God is clearly the prime candidate. In order to make the case for a designer, writers/producers Stephen C. Meyer and W. Peter Allen employ numerous industrial metaphors. Bacteria are described as being 'packed with circuits, assembly instructions, and miniature machines.' (Meyer & Allen 2005, p. 11). Microbiologist Michael Behe (Lehigh University) emphasizes the ubiquity of these technologies:

> At the very basis of life, where molecules and cells run the show, we've discovered machines. Literally, molecular machines. There are little molecular trucks that carry supplies from one end of the cell to the other. There are machines which capture the energy from sunlight and turn it into useable energy. (Meyer & Allen 2005, pp. 11-12)

In total, 39 variants of the word 'machine' appear in UMOL, including 11 uses of 'molecular machine' alone.

Meyer and Allen's commitment to the machine metaphor is particularly evident in the discussion of the bacterial flagellum. Michael Behe recalls his first encounter with the flagellum:

> It had a propeller and hook region and the drive shaft and the motor and so I looked at that and I said, 'That's an outboard motor. That, that's designed! That's no chance assemblage of parts.' (Meyer & Allen 2005, p. 12)

Microbiologist Scott Minnich (University of Idaho) adds:

> The bacterial flagellum—two gears, forward and reverse, water-cooled, proton motive force. It has a stator, it has a rotor, it has a U-joint, it has a drive shaft, it has a propeller.

> And they function as these parts of machines . . . (Meyer & Allen 2005, p. 13)

Behe and Minnich's enthusiastic commentary establish the correspondence of a flagellum to an outboard motor, while animation wizards Tim Doherty and Jerry Harned illustrate the point. Starting with an 'electron micrograph' of a 'flagellar motor', (fig. 1), Doherty and Harned add a shaft with a gear on its end (fig. 2), then gradually add structural elements (figs. 3-4). In figures 2-4, we see essential parts of an outboard motor: a shaft, a gear, and collars resembling bearings. Furthermore, like an old outboard motor, many of these parts are the color of rusting steel. Doherty and Harned also show the viewer that like all machines, the flagellum has a blueprint (fig. 5), and such planning, of course, implies a Designer.

Figure 1: An 'electron micrograph' of a flagellar motor (*UMOL* 16:45).

Figure 2: The animators overlay a driveshaft and gear to the electron micrograph (*UMOL* 16:52). Note that the gear is the color of rusting steel.

Figure 3: Bearings are added, also the color of rusting steel (*UMOL* 16:57).

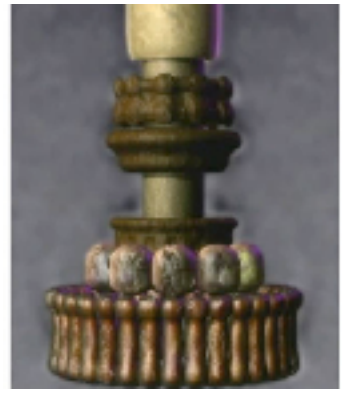

Figure 4: The animators have replaced the original electron micrograph with a complete 'flagellar motor.' (*UMOL* 17:04).

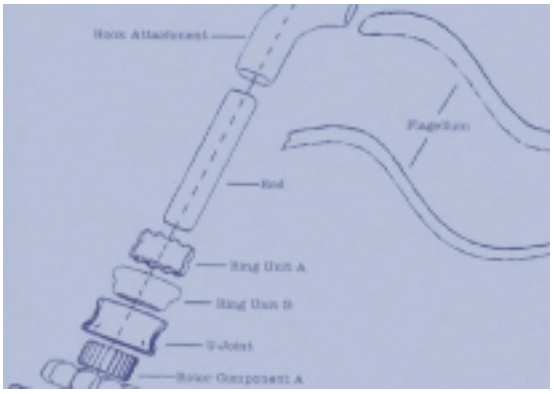

Figure 5: Flagellar blueprints (*UMOL* 26:11).

In their animation of cellular protein synthesis, Doherty and Harned exchange images of rusty low-tech gears for advanced materials and processes, evoking a futuristic, science-fiction-like world. DNA is imaged as a chain of interchangeable plastic parts (figs. 6-7). A "molecular machine" unwinds a DNA strand (fig. 8), then another molecular machine constructs RNA (fig. 9). In Figure 10, a 'molecular factory' (the ribosome) manufactures a chain of amino acids in an

'assembly line.' Emphasizing the factory metaphor, the chain rests while a part is added, then slides forward and rests again while the next part is added. As microbiologist Dean Kenyon (San Francisco State University) enthusiastically summarizes the sequence: 'This is *absolutely mind boggling* to perceive at this scale of size such a finely tuned apparatus, a device, that bears the marks of intelligent design *and manufacture*.' (Meyer & Allen 2005, p. 37, emphasis in video).

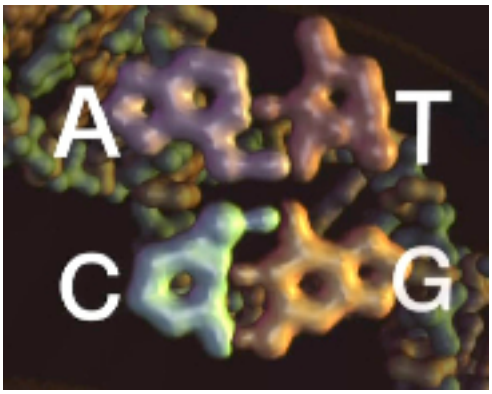

Figure 6: The nucleotides adenine, thymine, cytosine, and thymine, imaged as plastic parts (*UMOL* 40:57).

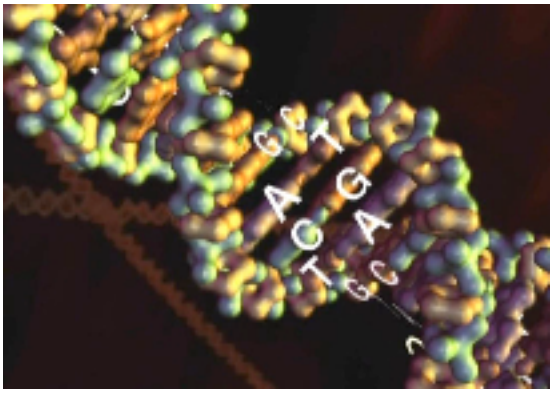
Figure 7: Nucleotides organized in DNA (*UMOL* 41:08).

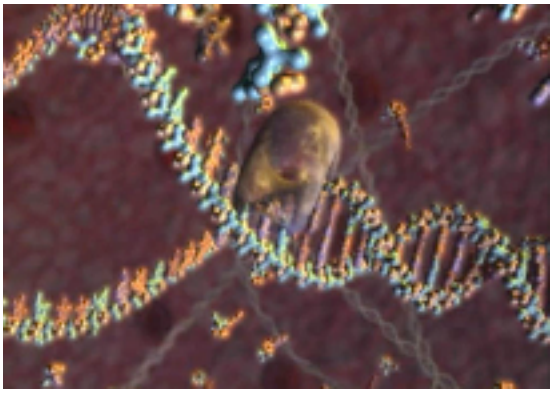

Figure 8: 'In a process known as 'transcription,' a molecular machine first unwinds a section of the DNA helix to expose the genetic instructions needed to assemble a specific protein molecule.' (Meyer & Allen 2005, p. 35; *UMOL* 47:29).

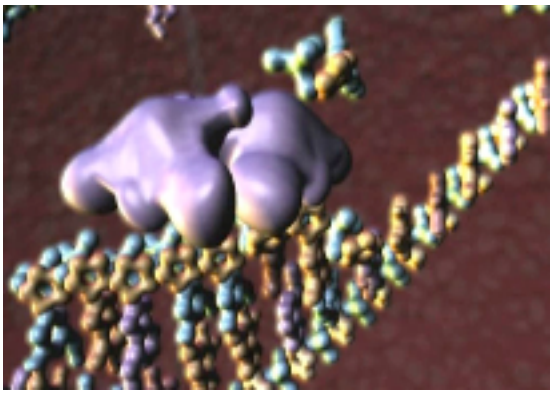

Figure 9: 'Another machine then copies these instructions to form a molecule known as "messenger RNA."' (Meyer & Allen 2005, p. 36; *UMOL* 47:40).

Figure 10: 'The messenger RNA strand is directed to a two-part molecular factory called a ribosome. After attaching itself securely, the process of translation begins. Inside the ribosome, a molecular assembly line builds a specifically sequenced chain of amino acids.' (Meyer & Allen 2005, p. 36; *UMOL* 48:45).

The Apparent Paradox of UMOL

UMOL argues that the bacterial flagellum and protein synthesis are 'irreducibly complex' systems, i. e. each system is disabled by the removal of any part. Therefore they could not have evolved and they must have a designer. But in order to make this case, UMOL's producers adopt a Cartesian body, part of the same de-spiritualized, mechanistic universe that contributed to the abandonment of the God hypothesis in modern science. One could ask how such a mechanical universe is compatible with biblical metaphor, in which mountains burst into song, trees clap their hands (Isaiah 55:12), rocks threaten to cry out (Luke 19:40), and the world groans in anticipation of redemption (Romans 8:22). One could also ask, just as the contemporaries of Boyle and Newton asked, what God would do following the work of design and creation. Following Descartes, Boyle, and Newton, Meyer & Allen could assign housekeeping chores like tweaking the creation when necessary or implanting souls into the cyborg-like collection of machines that UMOL reveals people to be. But such a God would be close to the God of the Deists and far from the active, personal God of Evangelical Christianity. Thus UMOL appears to lead its viewers into a religious cul-de-sac, trading belief in an active God for belief in a designer.

Yet we can resolve this paradox, at least partially, by remembering that although ID/creationism rejects evolution and emphasizes ancient texts, it is not a primitivist movement but a decidedly modern one (Marsden 1995). A cornerstone of the Protestant Reformation was the abandonment of allegorical readings of scripture in favor of its literal, common-sense interpretation. This de-mystification of scripture paralleled the de-spiritualization of the physical world (Harrison 2006). In American fundamentalism, this style of biblical interpretation became highly inductive: without preconceived ideas, one reads the "facts" of scripture and collects them

into principles and conclusions. Under the influence of Scottish Common Sense philosopher Thomas Reid, this Baconian approach to scriptural interpretation found its parallel in a Baconian approach to science among American fundamentalists (Marsden 1980, 1984, 1991; Taylor 1996). Law Professor Phillip Johnson (University of California at Berkely) expresses this naïve inductivism in UMOL: 'The argument for intelligent design is based upon observation of the facts. Now that's my definition of good science. It's observation of the facts.' (Meyer & Allen 2005, p. 45). Invoking a Cartesian world view and a naïve-inductivist philosophy of science, UMOL appeals to familiar Baconian themes in Christian fundamentalism. Resonance with these themes more than counterbalances the risk that God will become irrelevant in its mechanistic worldview.

Science educators are typically advised to help our creationist students by emphasizing the "nature of science." (see, e. g. National Academy of Sciences 1998). By clearly demarcating science from religion, it is hoped that creationists will recognize that creationism is a religious practice rather than a scientific practice. However, UMOL casts doubt on the utility of such a strategy. Where science educators explain that in science, divine intervention is disqualified as an explanatory principle for natural processes, viewers of UMOL can readily agree: after creation, the physical world appears to operate without divine intervention. Should science educators present the highly inductive version of the 'scientific method' typically found in science textbooks, this will reinforce the naïve-inductivist view of science already professed by creationists. Therefore without a sophisticated post-Baconian version of the nature of science (e. g. Matthews, 1994; McComas, 1998), nature-of-science education is unlikely to change the minds of creationist students.

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