

## Science and Religion

### Paper 3 round 1

#### Evolutionary, Reducible Complexity

In Michael Behe's book *Darwin's Black Box* he repeatedly makes the claim that Darwinian thinking is refuted by the appearance of irreducibly complex systems in living organisms. Irreducible complexity is the idea that in an operating system every intermittent part is indispensable and if one aspect was not present the entire operation would fail. He claims that irreducibly complex systems could not have come about by random mutations since all parts of the system are so reliant on each other they must have all come about at the same time. Behe claims that this leaves room for only one answer, those aspects of the organisms must have been intelligently designed. His assertion is the result of a "misunderstanding about evolution, molecular organization and scientific inquiry" (Dorit). He is lacking a thorough understanding of the evolutionary process and has not done adequate research to make the assertions in his book he made. Contrary to Behe's belief, irreducibly complex systems are not impervious to by step-by-step evolution. In H. Allen Orr's review of *Darwin's Black Box*, he refutes Behe's claim by asserting that "an irreducibly complex system can be built gradually by adding parts that, while initially just advantageous, become—because of later changes—essential."

Irreducibly complex systems coming about by intelligent design is a god of the gaps argument. It is a result of a misunderstanding in the workings and ideas of evolution. These systems arise through the addition of small parts over a long period of time. These small parts, while in the beginning were not essential in life, offered an advantage for survival. Later on after further evolutionary steps and the addition of other

elements to the system, the once advantageous mutation became indispensable because of the reliance of other parts of the system on that one aspect. Over time this repeated process arrived at a system that was so complex every aspect was necessary for operation. Evolutionary geneticist H. Allen Orr describes the process very well:

“Some part (A) initially does some job (and not very well, perhaps). Another part (B) later gets added because it helps A. This new part isn't essential, it merely improves things. But later on, A (or something else) may change in such a way that B now becomes indispensable. This process continues as further parts get folded into the system. And at the end of the day, many parts may all be required.”

In the end this irreducibly complex system came about, step-by-step through the evolution. New parts interact with old parts, old parts change functions slightly, and eventually you arrive at a system which fulfills a role accomplished before but is now accomplished more efficiently by parts which are all necessary.

Orr offers an example of this in the evolution of lungs. At first air bladders existed in all water living organisms. The lung first came about in some of these animals in addition to the air bladder offering an advantage to those organisms. Those with lungs could explore the terrestrial world for food and sustenance. As evolution took its course and animals began to live more and more on land the air bladder eventually started to go away. This made the lung, which at one time was not necessary for life, necessary. The lung became the only way land animals who no longer lived in water could breathe. This example shows how the lung, which is necessary for life, came about by mutations gradually and did not all come about at one time. Behe does not address the formation of

the lung directly in *Darwin's Black Box* but the same process could very well have happened in the formation of the eye. Different parts of the eye came about by single mutations that improved the function of the eye at first. It was not necessary but it provided the organism with an advantage of improved light sensitivity or sight. This repeated itself as evolution progressed and as more and more parts of the eye developed. The role that each part played on the other became so significant that by the end of the day, the eye could not function without every single part of the eye present. So yes the eye is irreducibly complex but it became that way by parts developing through evolution and interacting with old parts in a way that made them indispensable. Not only is this theory true in biology and nature, but it happens in the technological world as well.

Orr tells us in his review of Behe's book that this changing of advantageous parts into indispensable parts is something that is seen in computer programming all the time. He makes the analogy:

“Anyone who programs knows how easy it is to write yourself into a corner: a change one makes because it improves efficiency may become, after further changes, indispensable. Improvements might be made one line of code at a time and, at all stages, the program does its job. But, by the end, all the lines may be required. This programming analogy captures another important point: If I were to hand you the final program, it's entirely possible that you would not be able to reconstruct its history—that this line was added last and that, in a previous version, some other line sat between these two. Indeed, because the very act of revising a program has a way of wiping out clues to its history, it may be impossible to reconstruct the path taken (Orr).”

This correlates directly to the evolution of irreducibly complex systems in biology. It may be impossible for us to trace back step by step what happened in the evolutionary puzzle, but that is not because it was all designed and came about at once. It is because as new parts evolved, the way things interact with each other change. This happened so many times with old pieces being discarded and changed constantly, we can't know exactly how everything interacted when pieces that are no longer there or now look completely different, played a role in the system's operation.

In Behe's book he describes in detail the very complex mechanism the human body has for blood clotting. Several times he refers to genes that are very similar and have indispensable functions, but he never acknowledges the fact that genes can duplicate. Gene duplication is something the Nobel Prize winning geneticist H.J. Muller found evidence for and is now regarded as common knowledge within the world of evolutionary biology (Orr). Gene duplication comes about in the following way. Over time an extra copy of a gene was made, that at first was not necessary because obviously the organism got along perfectly fine without it. That extra gene changed with time and picked up a new function, often one that was related to the original function. As evolution progressed that gene became essential in the operation of the previous system that had at one point worked perfectly fine without it. Now it is simply more efficient and more complex (Orr). There are tons of examples of this in the human body. Myoglobin for instance, carries oxygen to the muscles and hemoglobin carries it through the blood. Both are now necessary but they came from the same original gene (Orr). Behe completely evades the idea of gene duplication in his arguments because this points to a step-by-step process in which blood clotting for example came to be so complex. Genes duplicated

and picked up new similar functions, explaining why there are so many similar genes that play crucial roles in blood clotting.

Behe's arguments for intelligent design fall apart when more thorough research is done in the biological and genetic fields. Gene duplication and the slow progression of genes switching roles describe how systems that are irreducibly complex came about through evolution as opposed to being inserted by an intelligent designer at some point in time. Behe's argument is a god of the gaps argument. He doesn't have an answer for how things could have been, and since he can't explain it he claims that it must have been a designer that filled in the gaps. This argument is illogical when you step back and take a look at the evidence and actual workings in the evolutionary process.

## Bibliography

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