THE SOURCE Workbook

Chapter 4 – DESIGN AS EVIDENCED IN LIFE

Page – 41 Design Within the Cell

q-41.1 What complications arise when we try to define what we mean when we say "life?"

Page – 42 The Complexity of the Cell

q-42.1 How can life be defined if you limit the definition to individual cells?

q-42.2 Although a living cell may appear to be simple, to what can we compare it?

Page – 43 Stanley Miller's Experiment

q-43.1 What translation task does the RNA molecule perform?

q-43.2 What is so fantastic about the combined length of all the DNA strands found in a human body?

Page - 44

q-44.1 What did the Stanley Miller experiment in 1953 seek to synthesize?

q-44.2 What erroneous assumptions did they make about the make-up of the earth's early atmosphere?

Page – 45 Probabilities for Protein

q-45.1 What were the initial results of the Miller experiment?

q-45.2 What is Miller's attitude now with regard to making polymers from amino acids using natural means alone?

Page – 46

q-46.1 What is one of the most powerful arguments against the "natural development" of the DNA molecule on earth?

Page – 47 Design in Nature

q-47.1 What probability odds do mathematicians consider to be impossible to achieve?

q-47.2 Why can saying that life came from outer space make perfect sense to a Christian?

Page – 48 Evolution

q-48.1 What feature is designed into DNA that allows it to quickly change to compensate for environmental changes?

q-48.2 What does the term "latitude effect" mean, and what is its cause?

Page – 49 Symbiosis

q-49.1 Why has it been important that people can "micro-evolve?"

q-49.2 What is a "symbiotic relationship," and what question seems to automatically arise regarding its development?

Page – 50 Ecosystematic Design

q-50.1 What 3-way symbiosis has been discovered that effects the South American leaf cutting ant?

q-50.2 What can be said about this particular ant's three-way bio-symbiosis?

Page – 51 Photosynthesis; Unique Animal Adaptations

q-51.1 Why is photosynthesis a fundamental support for all life on earth?

q-51.2 Give some examples of animals with heat exchange problems and how these problems were resolved.

Page – 52

q-52.1 How efficient is the whale's tongue in conserving its body heat?

q-52.2 What questions arise regarding the angular and archer fish?

q-52.3 How do some critics of Intelligent Design arguments expose themselves as being driven more by faith than by science?

Page – 53

q-53.1 How can instinct be defined?

q-53.2 How is instinct astonishingly demonstrated in the birth of a kangaroo?

Page – 54

q-54.1 How does animal instinct show evidence of design by a creator?

End of Chapter 4

The Source Workbook - Answers

Chapter 4 – DESIGN AS EVIDENCED IN LIFE

Page – 41 Design Within the Cell

q-41.1 What complications arise when we try to define what we mean when we say "life?"

The more you think about this question, the more difficult it becomes to find a simple answer. Systems like crystals grow by processing nutrients taken from their environment, but they are not alive. Viruses seem to have all the essential elements of life, but they can't reproduce themselves -- they need to take over the reproduction system of a host in order make copies of themselves. Some definitions require mobility within the definition, but that becomes a problem when dealing with plants. We know that they are living, but not necessarily mobile. When was the last time you saw a large oak tree running down the street after a fire truck for a drink of water? Not very often, for sure. It would appear that the best definition should focus on individual cells that make up organisms.

Page – 42 The Complexity of the Cell

q-42.1 How can life be defined when you limit the definition to individual cells?

A living cell must be 1) completely enclosed by a semi-porous membrane; 2) contain a complete set of coded, active, information-molecules (DNA); and 3) inherently possess the chemical means to continuously replicate itself as needed.

q-42.2 Although a living cell may appear to be simple, to what can we compare it?

It can be likened to a high-tech factory or a small city.

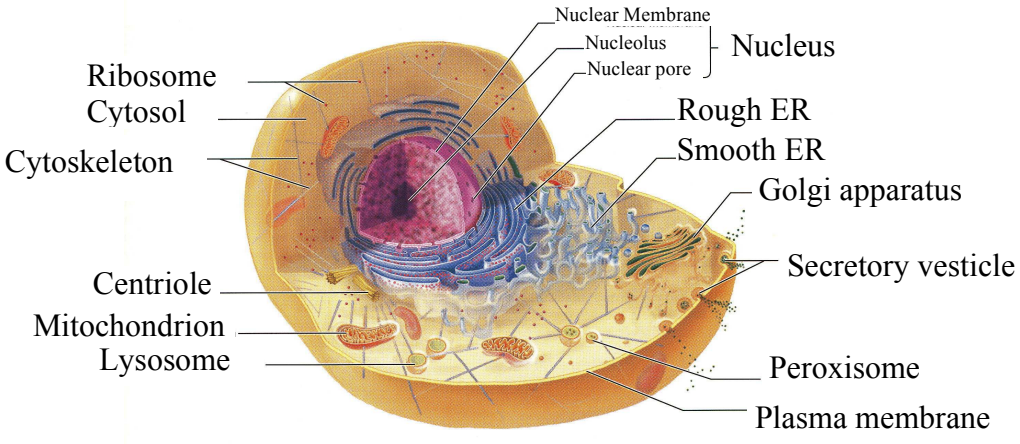

Figure 4.1: Once thought to be no more than a bag of protoplasm, the cell is now known to be as complicated as a high-tech factory or even a small city.

Page – 43 Stanley Miller's Experiment

q-43.1 What translation task does the RNA molecule perform?

RNA must translate the "language" of "nucleotides" into the language of "amino" acids when building proteins and functional enzymes. This means that the RNA molecule must know how to translate a 4-letter chemical instruction into a different code using a 20-letter chemical instruction set to make the needed body building materials.

q-43.2 What is so fantastic about the combined length of all the DNA strands found in a human body?

There are about 2 meters of DNA in each body cell. Since there are about 10^13 (10,000,000,000,000) cells in our body, that multiplies into 2 x 10^13 meters combined length of DNA. We know that the sun is 1.5 x 10^11 meters from earth and twice that for a round trip. Divide the combined length of DNA in our bodies by the round-trip distance to the sun and you get 66.7 times. So the total length of DNA in our bodies is equal to about 67 times the distance to the sun, and back. The Source book uses 50 times as a conservative rounding down to the nearest midpoint unit of 100.

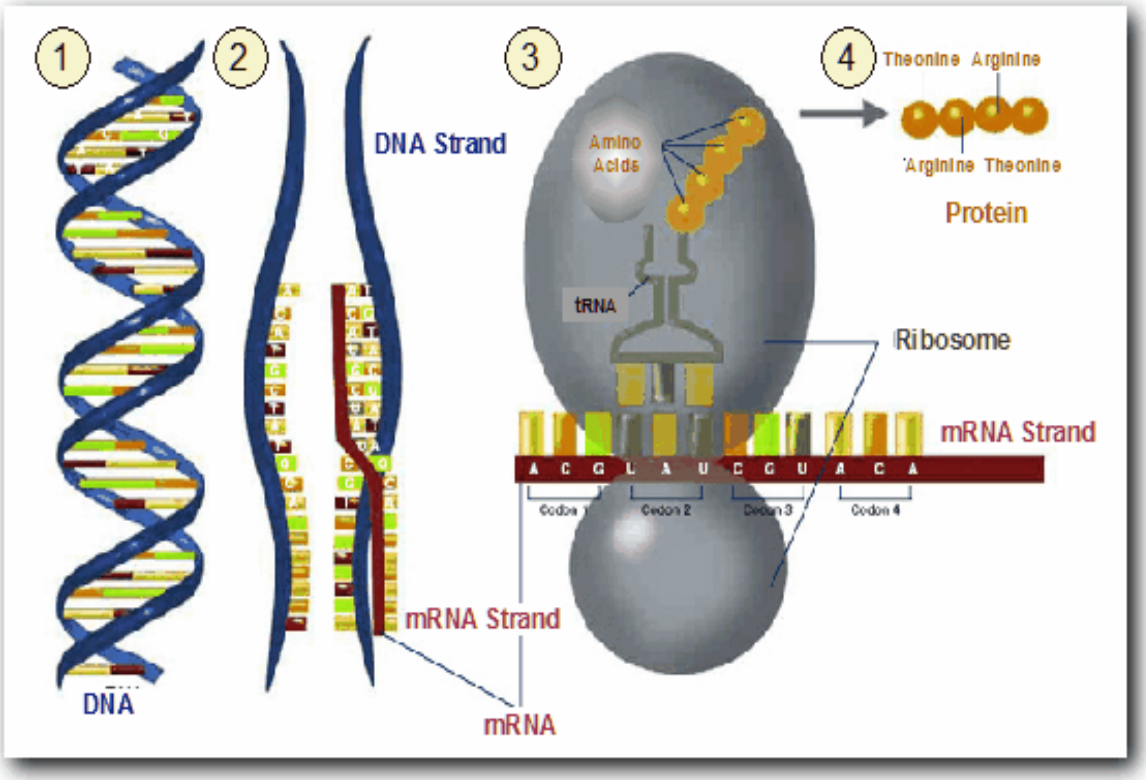

Figure 4.2: **(1)** A typical DNA strand. **(2)** The DNA strand is unzipped with the red messenger RNA copying its information. **(3)** This is a minute round particle composed of RNA and protein called a Ribosome that serves as the site of assembly in the cell for proteins copied from messenger RNA. **(4)** This is a finished protein that was assembled by the Ribosome factory.

Page - 44

q-44.1 What did the Stanley Miller experiment in 1952 seek to synthesize?

Because increased research has revealed the unbelievable complexity of the body's cells, there was increased pressure to look for a natural cause leading to its development. Miller performed an experiment in 1952 that managed to produce some simple biochemicals.

q-44.2 What erroneous assumptions may have been made about the make-up of the earth's early atmosphere?

This has been a subject of debate ever since the experiment was performed in 1952. (The experiment was performed in 1952 but due to a delay by one of the reviewers, it was not published until 1953. The atmospheric composition used in the experiment was not calculated from existing data; it was simply selected because it would support the experiment. Reviewing geologists quickly contended that the early atmosphere was primarily the result of "out gassing" which is what happens during volcanic eruptions. Based upon tests made today on volcanic gases, it is asserted that the early atmosphere was different from that used in the Stanley Miller (SM) experiment. In fact, if the experiment had been run using volcanic gases, it probably would have not given the same encouraging results. However, on September 8, 2005, two planetary research professors at Washington University in St. Louis (WU) released the findings of their new experiment that supported the assumed Stanley Miller testing gases. The WU experiment was based upon the analysis of gases contained in meteorite samples called Chondrites.

Figure 4.3: This is a picture of the original apparatus used in the Miller-Urey experiment that produced organic molecules from conditions that were said to simulate earth's early atmosphere. However, other relevant authorities say the atmosphere was different. Even though controversial, this experiment is still featured in high school textbooks as being a basis for asserting that life could form naturally without the help of any outside source, such as an intelligent designer.

Chondrites are relatively unaltered samples of material that are rocky remnants of the original solar nebula and are believed to be the building blocks of the planets. It is hypothesized that gases taken from them would correspond to earth's original atmospheric gases. Not everyone

agrees with this hypothesis, so the controversy still rages on. It is to be noted that these space-rocks were never part of a living, growing planet that no doubt produced unique gases during its development. The tested meteorite samples were simply a by-product of an exploding star which contained gases acquired during the explosion. Ancient earth-rocks do not support the hypothesis because there is strong evidence that methane and ammonia could not have been major constituents of the early atmosphere. Without the presence of these two gases, this experiment would have failed.

Page – 45 Probabilities for Protein

q-45.1 What were the initial results of the Miller experiment?

The experiment produced "several kinds of amino acids." At the time, the experiment was hailed as a huge success. Many other scientists quickly followed it up with similar experiments.

q-45.2 What is Miller's attitude now with regard to making polymers from amino acids using natural means alone?

Miller is frustrated and admits that it is a serious problem that he has not been able to solve. He has subsequently moved on to other things, so to speak.

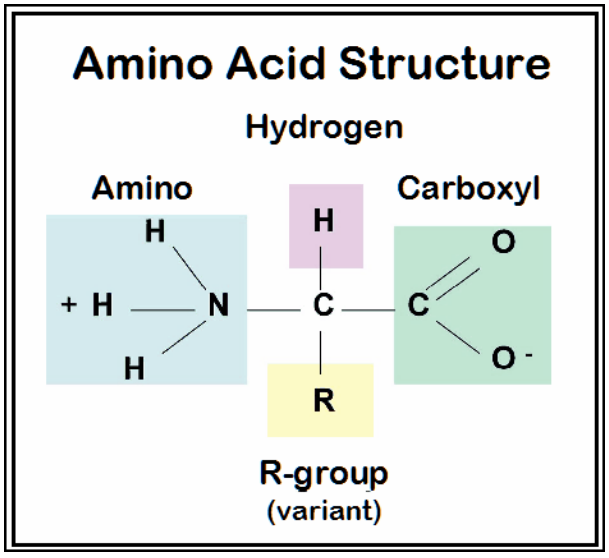

Figure 4.4: As can be seen, this life-essential component is somewhat of a simple structure. It can be likened to a snowflake that assembles naturally when conditions are just right. However, because many amino acid structures need unusual conditions to assemble naturally, it is considered impossible, based upon present evidence, that they could all co-exist at the same location under the same conditions long enough to produce anything even resembling life.

Page – 46

q-46.1 What is one of the most powerful arguments against the "natural development" of the DNA molecule?

The DNA molecule is so complicated that it can be considered impossible to have formed by natural processes. It can be said to be "irreducibly complex (IC)." This means that there is no natural step-by-step Darwinian process that can account for or explain its complexity. A good simple illustration of an IC structure would be a man-made stone arch. A segmented arch cannot be made piece by piece without a supporting scaffold to hold it together during construction. Until the Keystone is in place, the arch cannot support itself. The evidence shows this to also be true of the DNA molecule. The more it is studied, the more it resembles the construction of an arch. To get it completely assembled, some sort of scaffold is needed, something to hold it together until it can work by itself. To date, there is no acceptable natural scaffolding hypothesis that can produce any better results than the Miller-Urey experiment.

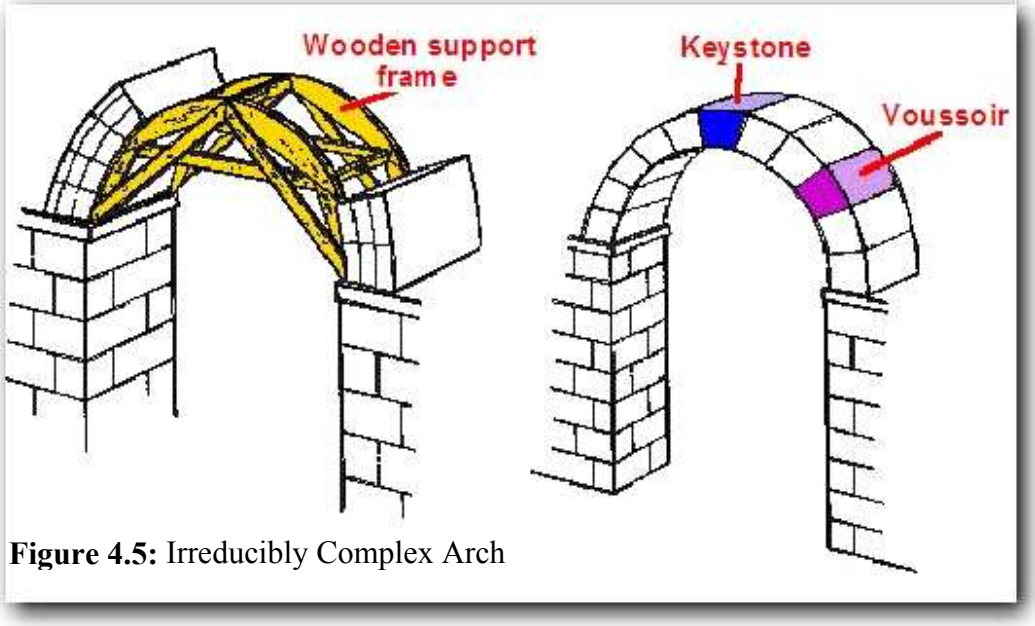

Figure 4.5: Irreducibly Complex Arch

Page – 47 Design in Nature

q-47.1 What probability odds do mathematicians consider to be impossible to achieve?

Generally, if the odds are less than 1 in 10^50, an occurrence of the event they represent is considered impossible. This can be thought of as a lower limit. Events with much higher odds can also be demonstrated by test or by mathematical analysis to be impossible to occur naturally.

q-47.2 Why can saying that life came from outer space make perfect sense to a Christian?

Since God can be said to come from beyond the universe, we can assume that He is in "outer space" and is the source of all life.

Page – 48 Evolution

q-48.1 What feature is designed into DNA that allows it to quickly change to compensate for environmental changes?

The DNA molecule contains specific sites that are called mutational "hotspots." These locations have built-in mechanisms not well understood that allow mutations to occur up to 100 times more frequently than normal. Evolutionary biologists claim that these sites are beneficial because they allow organisms to adapt more quickly to their environments. However, even this built-in adaptation process is always subject to certain limitations. It can only change the animal so much and then it stops and the animal goes extinct if the environment has changed beyond its ability to adapt. This rapid adaptive capability is demonstrated in bacteria when they, as a species, develop immunities to repeated exposure to harmful antibiotics. Because bacteria can reproduce so quickly, in a short time their mutational DNA hotspots will generate enough changes to become immune to the antibiotic within a relatively short period of time. The way this works is that initially the antibiotic may kill most of the bacteria, but there are always some that survive and pass on their particular set of survival genes to their offspring. With each new generation, there will be a growing number of survivors. Eventually, so many will survive that the antibiotic will no longer be effective in controlling them. However, it is to

be noted that this is not evolution in the "survival of the fittest" sense. The surviving bacteria are not as fit as their original parents and only change temporarily to meet the antibiotic threat. Unfortunately, in the process of changing, the bacteria were made less fit overall. This is confirmed by the fact that when the antibiotic is removed from service, subsequent generations of the same bacteria revert back to what they were originally before the threat arose. This is very much like how our personal immune system works. This example can be confusing because of the use of the word "mutation." The immunizing activity is labeled as a mutational process, even though it has been proven that almost all mutations are harmful. However, hotspot mutations are designed (by God) to allow an organism to adapt to its environment or defend against a disease potential and, therefore, the mutations are not harmful. In other words, mutations are mostly harmful except when they are part of a built-in mechanism. Technically, they should really be called conditional mutations because they are a predictable process used to accommodate changing environmental conditions. Such conditional mutations are actually a controlled series of substitution components. They are designed to provide a number of test antibodies for a trial-and-error procedure until the right one is found to defend against a newly introduced disease antigen. Generally speaking, to add to the confusion, this adaptive ability that is enabled by built-in mutational hotspots is called "evolution." To date, there has not been any uncontested explanation for why "hotspots" exist at all. Of course, being able to change by adaptation would be a reasonable expectation for an intelligently designed organism. For this reason, there is great interest in the current direction laboratory experiments are taking that relate to long-term evolutionary processes.

The March 8, 2007 of *Nature*, (Issue 7132; Volume 446) commented about this subject in the article entitled "The Elvis Paradox" by Andrew Hendry. Hendry references another article appearing in *The American Naturalist* Issue 169, 2007, page 227-244. The article suggests that the term "adaptation" be used to describe both short and long-term changes in body types. The article is indirectly saying that the term "evolution" as it is used to describe long-term change is misleading. This fact can be inferred from a concluding comment which states, "Change can be dramatic on short timescales, but rarely accumulates into substantial evolutionary trends." This conclusion can be reworded to say that, short-term micro-evolution cannot be used to prove long-term macro-evolution or evolution itself, as the word is currently used.

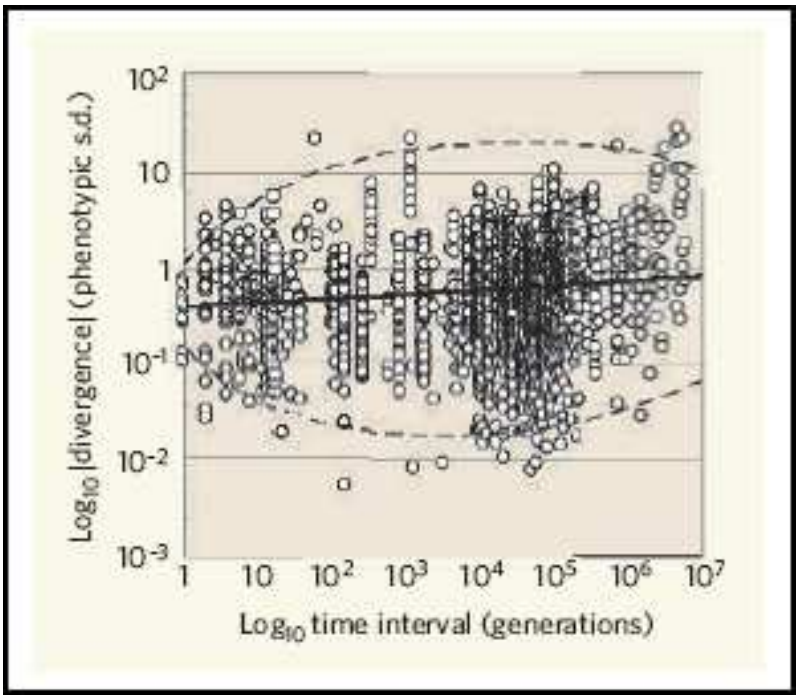

Figure 4.6: The Elvis Paradox shows that the evidence does not support long-term evolution. No matter how many generations are involved, long term change has not been found to exceed short-term environmental adaptations. Nature, 2007

q-48.2 What does the term "latitude effect" mean, and what is its cause?

The "latitude effect" is an indirect reference to humanity's ability to adapt to different climates through the process of micro-evolution. This can be seen in how humanity is distributed within the context of the "old world" from Africa to the Arctic. Darker skinned people survive better in hot, sunny environments, with light skinned people flourishing better in northerly cold climates. With some exceptions, that is the way we see the races distributed within the boundaries of what is known as the "old world." However, this does not seem to be the case within the boundaries of the "new world" which we call North, Central and South America. Originally, in the new world it seems that only one race of semi-light skinned people inhabited all land regions from the equator to the poles. How can this be, if the "latitude effect" is true? The current explanation is that the new world has not been inhabited long enough for a significant adaptive distribution to take place. By current estimates, it is feasible that the old world communities are as much as four times older than those in the new world. Additionally, the new world founder-population had less genetic diversity than did the old world founder-population, which most theists believe to have been Adam and Eve. The new world * founder-population was also descended from Adam and Eve but through an isolated branch of Adam's children that had already become adapted with lighter colored skin at a much later time in human history. So, naturally, their descendants wouldn't be able to produce skin color as dark as would be expected for a population who were genetically more closely related in time to Adam and Eve.

*** Founder population;** Wikipedia: *The **founder effect** [founder-population] was defined by Ernst Mayr in 1963 to be the effect of establishing a new population by a small number of individuals, carrying only a small fraction of the original population's genetic variation.*

Page – 49 Symbiosis

q-49.1 Why has it been important that people can "micro-evolve?"

The "latitude effect" has made it possible for humans to live in all of the earth's environments from the cold of the arctic to the tropical heat at the equator. One scientist at the Museum of Natural History in Washington, D.C., says humans are the most adaptable species on Earth.

q-49.2 What is a "symbiotic relationship," and what question seems to automatically arise regarding its development?

(A) This occurs when two or more living creatures develop a survival relationship with one another. Generally, we think of the relationship as being mutually beneficial. However, such is not always the case. It can be a relationship wherein both (mutualism), only one (parasitism), or neither parties (competition) actually benefit from the relationship. We are primarily interested in symbiotic relationships where mutual survival benefits are experienced by all the parties involved.

(B) Obviously, if a relationship for survival is symbiotic, how did it start? A good description of this problem is stated by Professor of Biology, Dr. Mary Ellen Clark who wrote, "Neither population could exist without the other, and hence the size of each is determined by that of the other." (*Contemporary Biology*, 1973, p. 519)

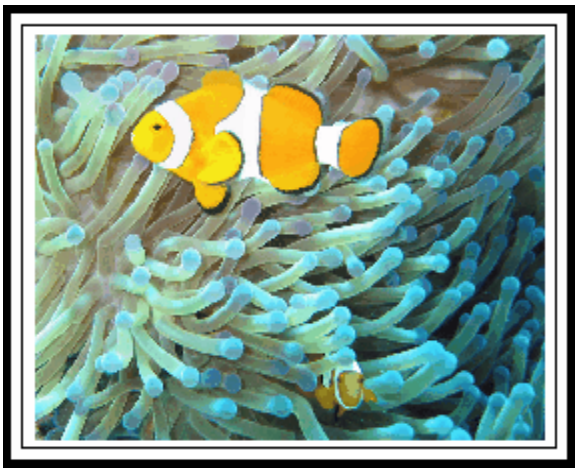

Figure 4.7: A Clownfish swimming harmlessly among the poisonous sting organelles of the Sea Anemone. They work together in a mutually beneficial lifestyle the details of which are still not fully understood. This activity would be fatal for any other fish.

Page – 50 Ecosystematic Design

q-50.1 What 3-way symbiosis has been discovered that affects the South American leaf cutting ant?

The three-way symbiosis arrangement is explained in Figure 4.7.

1.Ted R. Schultz, "Ants, Plants, and Antibiotics," *Nature*, 398 (1999), pp. 747-748.

2. Cameron R. Currie, James A. Scott, Richard C. Summerbell, and David Malloch, "Fungus-Growing Ants Use Antibiotic-Producing Bacteria to Control Garden Parasites," *Nature*, 398 (1999). 701-704.

q-50.2 What can be said about this particular ant's three-way bio-symbiosis?

Aside from the very low probability of this happening by chance alone, there is another ironical aspect to this relationship that has amazed investigators. We are familiar with the sad fact that antibiotics lose their effect after time due to the adaptive resistance of bacteria. However, according to evolutionists, the antibiotic used by the ants has been effective for up to 50 million years. This has caused Ted Schultz of the National Museum of Natural History in Washington D.C. to say that ant "antibiotics have remained effective against the fungus-garden pathogens for such a long time." Researchers are presently looking into this process to see if they might learn something that will help in prolonging the useful life of laboratory antibiotics.

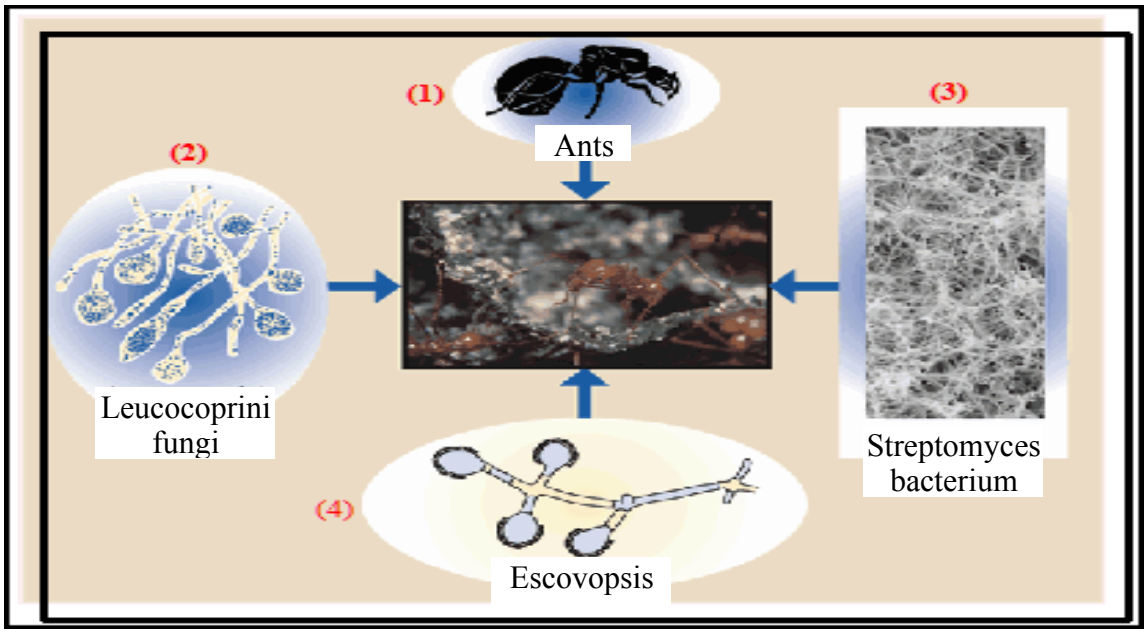

Figure 4.8: **(1)** Carpenter Ants collect leaves which they cannot eat because the leaves are protected by a built-in insecticide. **(2)** This Leucocoprini fungi can digest the leaves and insecticide and produce a harmless mushroom-like growth known as gongylidia that the ants can eat. However, this is only possible if the ants scrape off a waxy coating that normally prevents the fungi from eating the leaves. **(3)** This is a Streptomyces bacterium that lives on the ants body and produces an antibiotic that protects it from being attacked by the parasite Escovopsis. It is interesting to note that Streptomyces belongs to the genus from which over half of the antibiotics used by humans are derived. **(4)** This is the parasite, Escovopsis, which is itself also a fungus that monitors the effectiveness of the entire arrangement. If the plant-ant-fungus system becomes unhealthy, the parasite rapidly grows large enough to destroy the ant's garden. This parasite acts like a quality control officer making sure that the ant's food source remains healthy.

Page – 51 Photosynthesis; Unique Animal Adaptations

q-51.1 Why is photosynthesis a fundamental support for all life on earth?

Photosynthesis uses sunlight to directly create organic molecules and oxygen. These two components are the foundation of life as we know it.

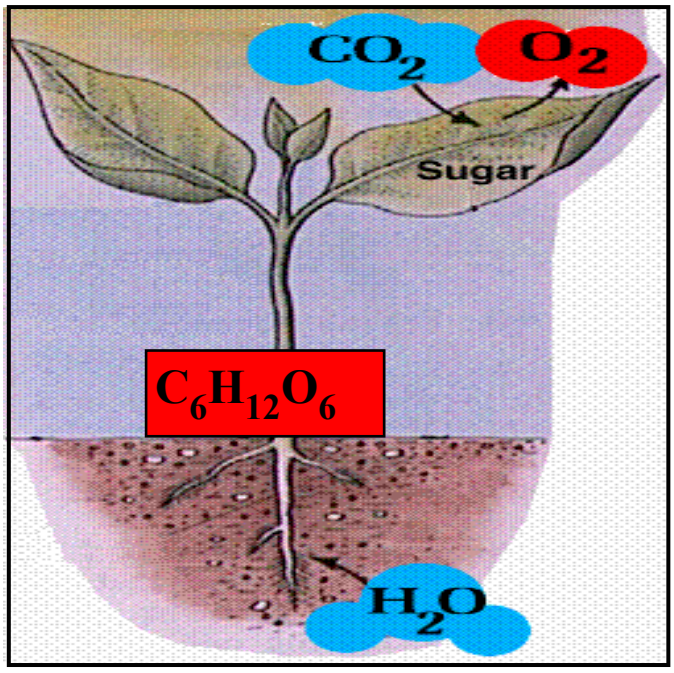

Figure 4.9: Six molecules of water plus six molecules of carbon dioxide produce one molecule of sugar [C6-H12-O6] plus six molecules of oxygen.

$6H_2O + 6CO_2$ ---------- > $C_6H_{12}O_6 + 6O_2$

q-51.2 Give some examples of animals with heat exchange problems and how these problems were resolved.

There are many animals that find themselves in cold environments that make retention of body heat critical for survival. Some of these are birds that wade in cold water, artic animals, like seals, dolphins, whales, and even humans. Sometimes when we go from a hot to a cold climate, at first it is hard to keep warm. However, it isn't long until we adjust, and we say our "blood has thickened." The actual cause for the adjustment is the activation of heat-conserving features built into our own bodies, as illustrated in Figure 4.9

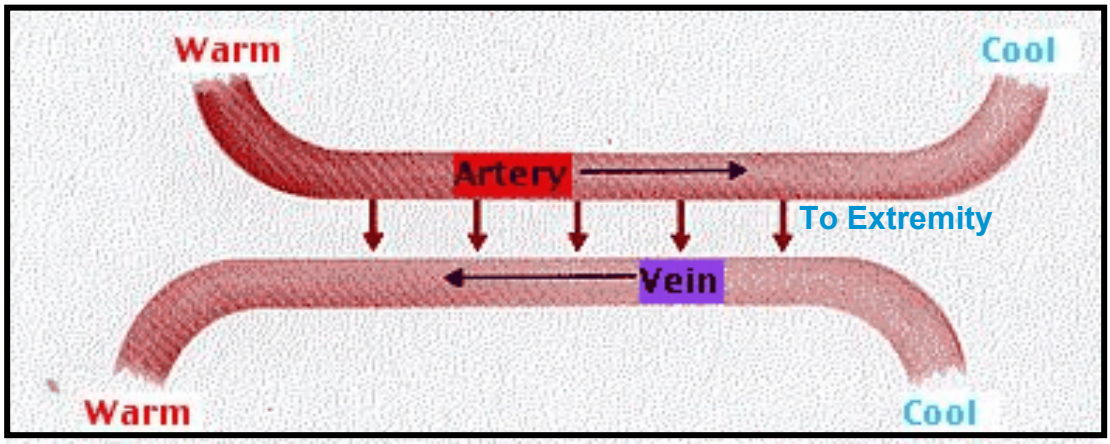

Figure 4.10: Many animals (including humans) conserve heat by having the arteries of extremities exposed to cold run parallel to a set of deep veins. As warm blood passes down the arteries, the blood gives up some of its heat to the colder blood returning from the extremities in these veins. These arrangements are called a **countercurrent heat exchangers**.

Page – 52

q-52.1 How efficient is the whale's tongue in conserving its body heat?

Even though constantly exposed directly to frigid water when hunting food, the whale's tongue loses less heat than the rest of its body.

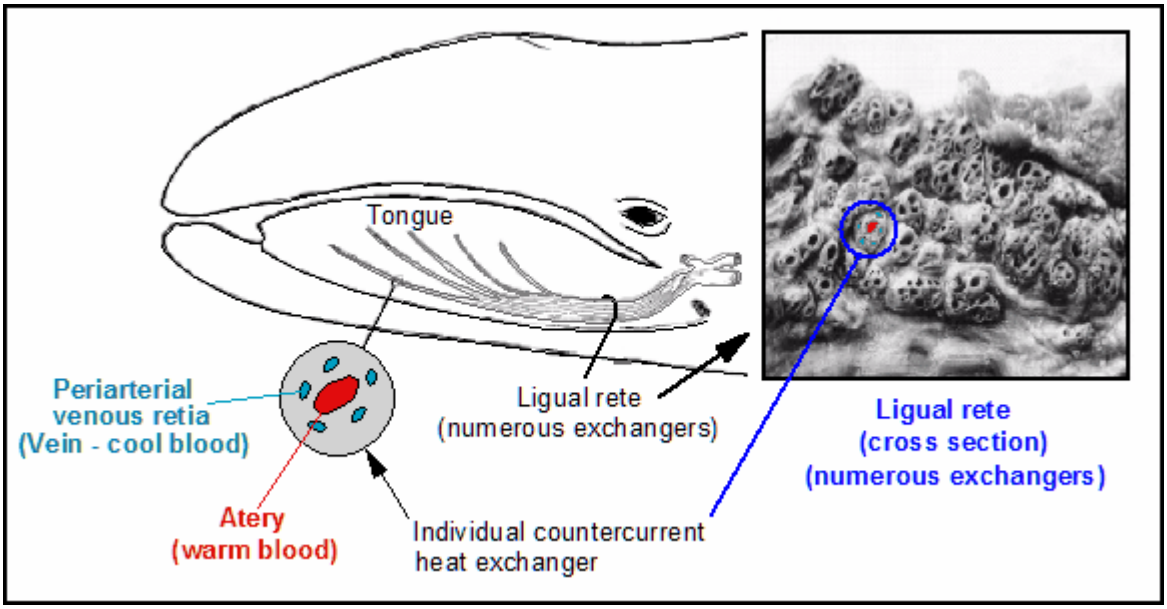

Figure 4.11: Showing a cross-section (**Lingual rete**) of the actual heat-exchanging structures. You can see the larger artery openings surrounded by the smaller veins. As **warm blood** flows through the arteries into the tongue, the **cold returning blood** in the veins picks up most of the heat. This is a very efficient system that keeps the whale's body blood warm.

q-52.2 What questions arise regarding the Angular and Archer fish?

As shown in Figures 4.11 A&B, these creatures are good examples of design in nature. They have been gifted with special equipment, along with the ability to demonstrate remarkable skill in its use. Naturally, the question arises, if evolution is true, how did these creatures survive before they got their "special equipment?"

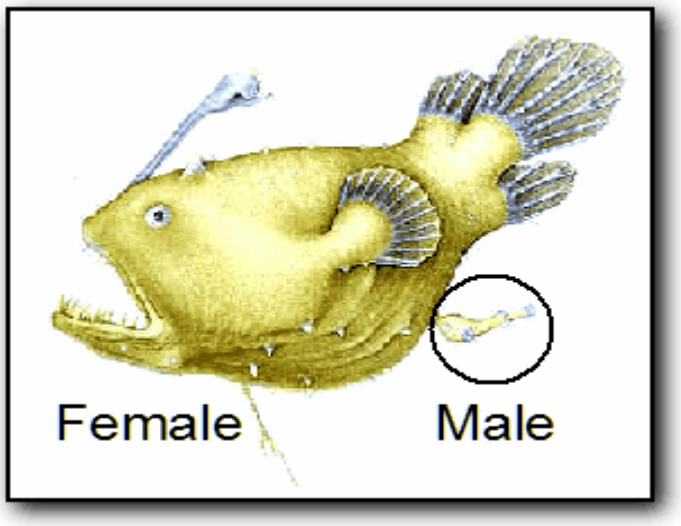

Figure 4.12A: The Angler Fish displays a noticeable example of "sexual dimorphism," with the female being about 10 centimeters long, and the attached male less than 1 centimeter. The name Angler comes from what looks like a fishing pole and lure attached to its upper lip. The fish lures smaller fish into its open mouth with this unique equipment.

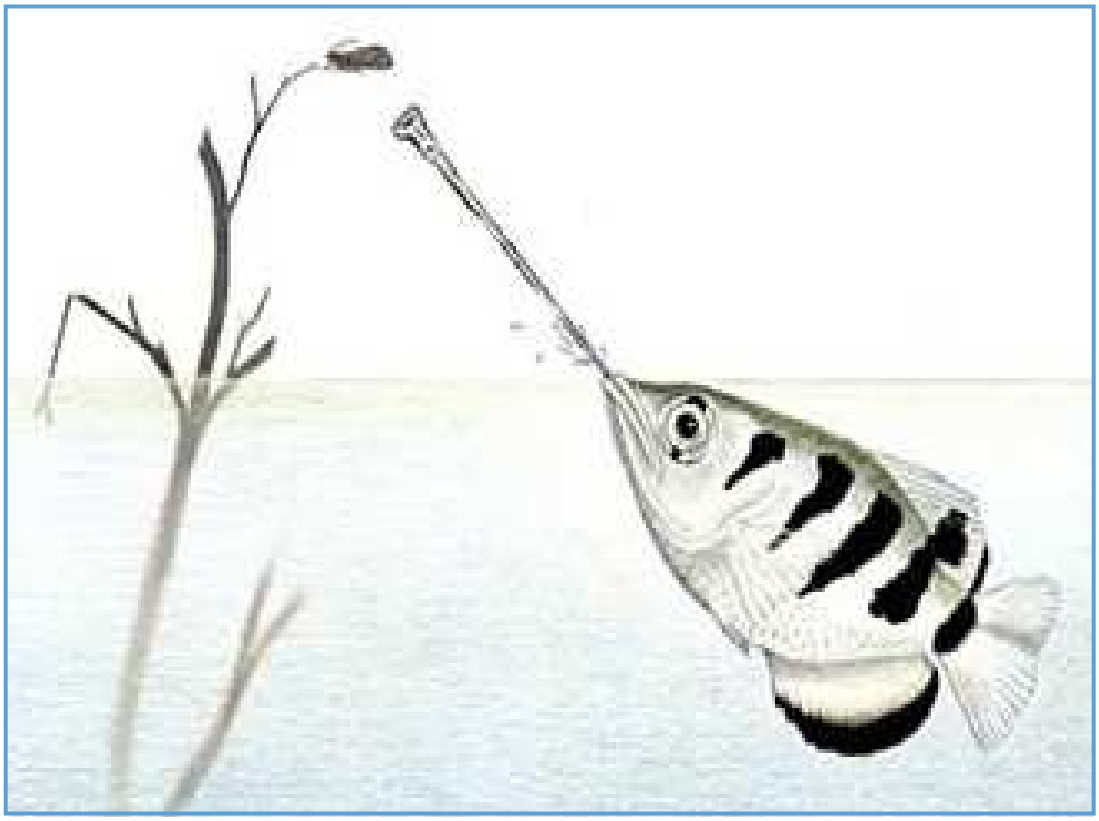

Figure 4.12B: The amazing Archer Fish can shoot down a bug up to 6 feet away. Remarkably, to do this, the fish must compensate both for the effects of water parallax and the curvature of the projected stream due to the downward pull of gravity. This is another example of design in nature.

q-52.3 How do some critics of Intelligent Design arguments expose themselves as being driven more by faith than by science?

Many of Richard Dawkins's arguments are more philosophical than scientific. He has become such an outspoken champion for atheistic evolution that he has been labeled as "Evolution's High Priest" in an article in the November 15, 2004, *National Geographic*. For him, this title has become quite common, indicating the religious nature associated with his worldview. This association is based on Dawkins's apparent open hostility to religion and the concept of God. For instance, in the August 15, 1997, issue of *Science*, Vol 277, no. 5328, p. 892, Richard Dawkins is quoted as saying that "belief in a higher purpose is an illusion." In a universe of selfish genes and blind physical forces, he says, "faith is a dead issue." In the same issue Dawkins said, "The universe we observe has precisely the properties we should expect if there is at bottom no design, no purpose, no evil and no good, nothing but pointless indifference." This is somewhat of a bizarre comment and has no value as a statement of fact. It is solely based upon Dawkins's philosophical belief that there is no God. If it were based upon evidence, as he claims, then our present reality would be so statistically *unexpected* that we would constantly marvel that we exist at all.

Page – 53

q-53.1 How can instinct be described?

Instinct can be described succinctly as unlearned knowledge. Such knowledge is apparently programmed into our genes. There are many examples of animal instinct but one that amazes us all is how a spider knows how and where to spin a web. How did it survive before it developed this remarkable skill.

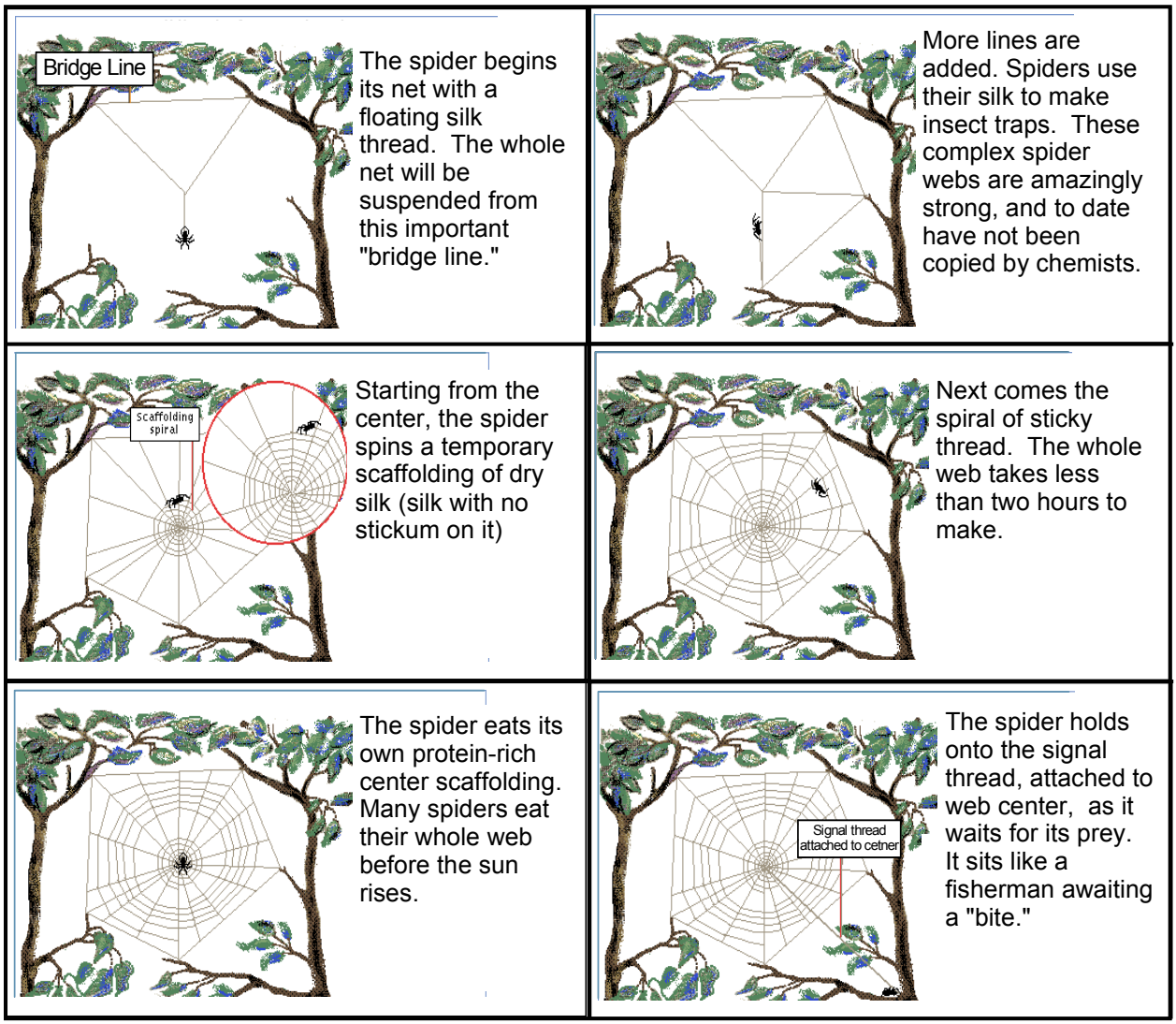

Figure 4.13: An example of a spider's instinctive knowledge.

q-53.2 How is instinct astonishingly demonstrated in the birth of a kangaroo?

Based upon common sense, it seems almost impossible for a baby kangaroo, called a joey, to be born as shown in Figure 4.14.

Figure 4.14: Even though it is deaf and blind, the newly born kangaroo uses its sense of smell to find its way to the pouch while crawling through the mother's abdomen hair. Occasionally the mother licks a smooth path as shown in this photograph. Other than this, she offers no additional help. At birth a joey is as small as a bean and weighs only 3/4 of a gram. Depending upon the size of the specie, after six and ten months, a joey will start venturing outside of the pouch, although it still spends most of its time inside. However, a few months later it will leave the pouch for good.

Some interesting facts about kangaroos in general are that they usually breed continuously throughout the year, although some, such as the Eastern and Western Greys tend to be seasonal breeders. The gestation period (this is the time during which the baby grows inside the mother's body before birth) lasts only about four or five weeks, and then the animal leaves the womb and is born, so to speak. By comparison, it takes a human embryo about seven weeks be similarly developed. However, it will take at least another 16 weeks before the human baby can leave the womb and survive. At birth the baby kangaroo, using only its uniquely developed forelimbs, climbs from the birth canal directly into the mother's pouch. Once in the pouch, by instinct, it attaches its mouth over one of four teats, which then enlarges inside its mouth to hold the developing kangaroo in place until it can take care of itself.

Page – 54

q-54.1 How does animal instinct show evidence of design by a creator?

Many of the examples we have examined show evidence of supernatural wisdom and design because there is no credible natural explanation available to account for the behavior or skill. This is powerful evidence of God’s existence and handiwork.

End of Chapter 4