

# Ontogeny Recapitulates Phylogeny, Or Something Like It!

In my first scientific symposium presentation, I suggested that there is but one principle which provides the context for all scientific, philosophic, and religious systems, the Cosmogenetic Principle. This universal principle suggests three elements to our interpretation of all energy systems: 1) the *underlying unity* associated with those systems, 2) the *spectacular intelligent diversity* that emerges from that unity, and, 3) the fact that every living system possesses a unique and meaningful destiny or purpose, *autopoiesis*. Roy Varghese, Templeton prize winner in science and religion, suggests just this when he asks us to consider three dimensions to the miracle of life: 1) the “*unity associated with intelligent message processing in the cell,*” 2) “*the diversity that extends from ameba to dinosaurs to human beings emerging from a common biological blueprint,*” and, 3) “*autopoietic, autonomous, interdependent agents that replenish and replicate themselves,*” attempting to become exactly what they were intended to become! (pg.44) Paleontology, biology, and genetics, as disciplines have all served to illustrate these three aspects of the Cosmogenetic Principle. If you really understand the depth, breadth and length of these three attributes: unity, diversity, and autopoiesis, you have the key to understanding matter, mind, and spirit; science, philosophy and religion. In other words, you have the key to understanding reality, God and creation.

## Unity: Intelligent Message Processing

At the level of **unity**, all life revolves around the common experience of the cell, with their proteins and nucleic acids, DNA and RNA. All life consists of an intelligent message consisting of the recombination of Adenine, Guanine, Cytosine, and Thymine, the unified alphabet of all life. Each and every cell of all life swims in a sodium chloride solution, a salt water formula which formerly provided the nursery of life in the ancient seas, 550 million years ago.

*Your primitive ancestors freely circulated about in the salty ocean; today, this same oceanlike salty solution freely circulates about in your bodies, bathing each individual cell with a chemical liquid in all essentials comparable to the salt water which stimulated the first protoplasmic reactions of the first living cells to function on the planet. (58:1.4)*

The cell is the common denominator of all life, the unifier, which contains tens of thousands of constituent parts, each essential and each functioning along the biochemical pathways that determine the nature of life, itself. A strand of DNA (deoxyribonucleic acid) stores a blueprint, using the four simple letters, **A**(denine), **G**(uanine), **C**(ytosine), **T**(hymine). That blueprint ensures the exact duplication of everything when the cell divides into two; enzymes direct the cell’s biochemical reactions; small particles called ribosomes manufacture proteins (including the enzymes), which turn genes on and off; mitochondria break down compounds to release energy, without which none of us would be sitting here... the structure and functions of the cell are extremely complex, but they all answer to the fundamental unified logic of intelligent message processing. There is an underlying unity associated with all life.

In the early 1950s a young PhD candidate, Stanley Miller, changed his PhD topic to focus on what was called the Oparin/Haldane hypothesis, developed in the 1920s, suggesting that organic compounds could have been created by the effects of a huge amount of energy provided by the Sun's ultraviolet radiation acting on the primitive atmosphere of the earth. They proposed that over millions of years the accumulating simple compounds in a 'warm little pond' would emerge into ever more complex molecules. Miller designed an experiment simulating the conditions thought to have been present millions of years ago, converting much of the carbon in his methane gas into amino acids and other organic compounds, the very stuff of life.

Miller was following the very dream of Darwin, who wrote:

"... If (and oh! what a big if!) we could conceive in some warm little pond, with all sorts of ammonia and phosphoric salts, light, heat, electricity, etc., present, that a protein compound was chemically formed ready to undergo still more complex changes..." *Charles Darwin*

It is interesting to note that the Life Carrier, writing Paper 58, writes:

**T**hat we are called Life Carriers should not confuse you. We can and do carry life to the planets, but *we brought no life to Urantia*. Urantia life is unique, original with the planet. This sphere is a life-modification world; all life appearing hereon was *formulated by us right here on the planet... 550,000,000 years ago the Life Carrier corps returned to Urantia. In co-operation with spiritual powers (Seven Master Spirits) and superphysical forces (the physical controllers) we organized and initiated the original life patterns of this world and planted them in the hospitable waters of the realm*. All planetary life (aside from extraplanetary personalities) down to the days of Caligastia, the Planetary Prince, had its origin in our three original, identical, and simultaneous marine-life implantations. (58:4.1,2)

Similar to the work of Miller, the Life Carriers formulated life using the material present on the planet. Dissimilar to the work of Miller, the Life Carriers' research, experimentation, and labor was a tad more sophisticated:

**T**his chemical action and reaction concerned in... cell reproduction represents the choice of the Life Carriers of *a formula embracing over one hundred thousand phases and features of possible chemical reactions and biologic repercussions*. More than half a million specific experiments were made by the Life Carriers in their laboratories before they finally settled upon this formula for the Urantia life experiment. (68:4.4)

In addition, both Miller and the Life Carriers share something in common, neither comprehended or were able to replicate "*the life-activation spark*," (36:6.6) that spark generated by Universe Mother Spirit. "*From the Creative Daughter of the Infinite Spirit comes that energy spark which enlivens the body and presages the mind*." (36:3.4)

After the work of Miller, many have been the scientists who have attempted to bring those compounds to life, unsuccessfully. Writes the magnificent Life Carrier:

**E**ver will Urantia physicists and chemists progress in their understanding of the protoplasmic forms of vegetable and animal life, but **never** will they be able to produce living organisms. Life is something different from all energy manifestations; even the material life of physical creatures is not inherent in matter. Things material may enjoy an independent existence, but *life springs only from life*. Mind can be derived only from pre-existent mind. Spirit takes origin only from spirit ancestors. The creature may produce the forms of life, but only a creator personality or a creative force can supply the activating living spark. (36:6.1,2)

Many are the confused philosophical scientists or scientific philosophers who insist on following the illogic that life can come from non-life! In other words: Can “A” come from “Not-A?” I daresay such philosophers would not affirm such a sentence in their classes on critical thinking. My observation is that such insistent illogic is usually motivated by infantile images of Deity as David Bentley Hart suggests in *Atheists’ Delusion*. Einstein and others balked at traditional, monarchical images of Deity, which they regarded as unworthy of that Illimitable Intelligent Spirit at the source of existence. Wrote Antony Flew, the most famous of modern atheists, after examining the facts associated with our genetic inheritance:

“**W**e have all the evidence we need in our immediate experience and that only a deliberate refusal to “look” is responsible for atheism of any variety.” Antony Flew

This former atheist, now theist, Flew suggests, the improbability of life is wild. Those who grow in their understanding of our biological roots can see this fact, as a result of examining so many facts. Just consider this from Bill Bryson, author of *A Short History of Nearly Everything*:

Proteins are what you get when you string amino acids together, and we need a lot of them. To make collagen, the name of a common type of protein, vital to the skin, you need to arrange eight letters in the right order. But to make collagen, you need to arrange 1,055 amino acids in precisely the right sequence. But – and here’s an obvious but crucial point – you don’t make it. It makes itself, spontaneously, without apparent direction, and this is where the unlikelihoods come in. The chance of a 1,055 – sequence molecules like collagen spontaneously self-assembling are, frankly, nil. It just isn’t going to happen. To grasp what a long shot its existence, visualize a standard Las Vegas slot machine but broadened greatly – to about ninety feet, to be precise – to accommodate 1,055 spinning wheels instead of the usual four, and with twenty symbols on each wheel, one for each common amino acid. How long would you have to pull before all 1,055 symbols came up in the right order to produce collagen? Effectively forever. Even if you reduced the number of spinning wheels to 200, which is actually a more typical number of amino acids for a protein, the odds against all two hundred coming up in the prescribed order are 1 in 10<sup>-260</sup>. Bryson, 288

## Diversity: The Hierarchy of Life

Starting with the Precambrian Period, we witness the explosion of life from three implantations of life on the planet “in the hospitable waters of the realm. All planetary life... had its origin in our three original, identical, and simultaneous marine-life implantations.” (58:4.2)

About that beginning, Darwin wrote: “*The mystery of the beginning of all things is insoluble by us; and I for one must be content to remain an agnostic.*”

As my teacher, Thomas Berry, writes: “Genetic mutation is a primal act of life... an irreducible activity at the heart of the unfolding universe. A mutation cannot be explained in itself any more than the strong nuclear force can be explained in itself... the early prokaryotes proliferated and differentiated so that in time they filled the seas... with the advent of photosynthesis came communion with the Sun, illustrating as well as anything the wild wisdom at the heart of the universe story...the cosmological power of differentiation explodes with a trillion new pathways.” (90)

Coincidentally, modern paleontology views the beginnings of multicellular life as commencing somewhere around 540M to 560M years ago, in line with *The Urantia Book*.

## Autopoesis: Autonomous Agency

Every form of life is fundamentally meaning/purpose-driven, to become what it was intended to become. This is denoted by the term: *autopoesis*. All of the activities of life are driven to meet specific goals, the will to survive, the will to belong, and the will to growth. In the course of such autonomous agency, there is the never-ending struggle to adapt to changes in the environment. “*Ever the environment is changing, and always are living organisms striving to accommodate themselves to these never-ending fluctuations.*” (58:6.6) Or, as Darwin put it: “*It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.*”

It is these three principles, unity, diversity, and autopoesis, which frame the miracle and mystery of all life. In the development of that miracle there have been a number of evolutionary moments that have made all the difference. I would like in this presentation to elaborate on seven of those moments or tipping points, each moment indispensable stepping stones toward the miracle of mortal life, the mystery of self-consciousness, the wonder of the will, and the capacity to choose to be like God:

## “Ontogeny Recapitulates Phylogeny,” Or Something Like It!

This catchy phrase was coined by Ernst Haeckel, a 19<sup>th</sup> century German biologist and philosopher to suggest that the development of each embryonic organism (*ontogeny*) expresses all the intermediate forms of its ancestors throughout all evolution (*phylogeny*). In other words, as embryos all life recapitulates all the evolutionary developmental stages that preceded our particular development. Think of evolution, from this perspective, as a series of Russian dolls, stages within stages repeated by every organism. Accordingly, the embryo of a human being would go through various stages, recapitulating evolution, from fish, to amphibian, to reptile, to mammal, to human. This idea has since been shown to be faulty. However, it captures an important idea and that is that we human beings carry vestigial, both functional and non-functional, reminders of prior stages of development, Paleozoic, Mesozoic, Cenozoic vestiges.

The embryos of different species are not completely identical, but their similarities are stunning and profound. All have gill arches, notochords, and look like a tube within a tube at some stage in their development. Additionally, all animals share what became known as the *three germ layers of development*, out of which every animal organ originates. The three layers form the same structures in every species. Every heart of every species forms from the same layer. Another layer gives rise to every brain of every animal. No matter how different the species look as adults, as tiny embryos they all go through the same stages of development. At a certain stage, one is hard pressed to distinguish between a frog, a lizard, an aardvark, and a human being. The features that distinguish us in our diversity – bigger brains in humans, shells on turtles, feathers on birds – arrive relatively later. (IF 103)

Said Charles Darwin:

*We must, however, acknowledge, as it seems to me, that man with all his noble qualities... still bears in his bodily frame the indelible stamp of his lowly origin.*

Within the field work of paleontologists, within the biological study of embryos, and within the analysis of DNA, there is an uncanny narrative that suggests that a Divine Intelligent Hand was involved in the work of creation. Again, former atheist and eminent philosopher Antony Flew writes:

**“I** now believe there is a God...I now think it [the evidence] does point to a Creative Intelligence almost entirely because of the DNA investigations. What I think the DNA material has done is that it has shown, by *the almost unbelievable complexity of the arrangements which are needed to produce life, that intelligence must have been involved in getting these extraordinarily diverse elements to work together.*”

At this point let us recall the words of *The Urantia Book*: “Reason, through the study of science, may lead back through nature to a First Cause, but it requires requires faith to transform the First Cause into a God of salvation...” (101:2.3)

## Seven Tipping Point Moments Leading to The Human Experiment

We shall examine seven remarkable aspects in the story of life on planet Urantia. These moments and their constituent elements point to a creative intelligence at the heart of all things and beings.

### 1) Functional Vestigiality is Remarkable!

When we go to zoos and aquariums, we observe, if we have the eyes to see, our wondrous connection to all life. At the Shed Aquarium in Chicago, we can observe non-vertebrate life, jellyfish and sea anemones; and, we can observe vertebrate life, fish! And, perhaps, even more advanced vertebrate life, seals and otters and, if we are lucky, a dolphin! When we examine the paleontological fossil record, the biologic development of embryos, and the genetic code it is clear that the differences between sea anemones, fish, amphibians, reptiles, mammals *pale in comparison* to their fundamental similarities.

With the **jellyfish and sea anemones** we can observe a genetic life body plan that is similar to **fish, amphibians, reptiles, mammals and humans**.

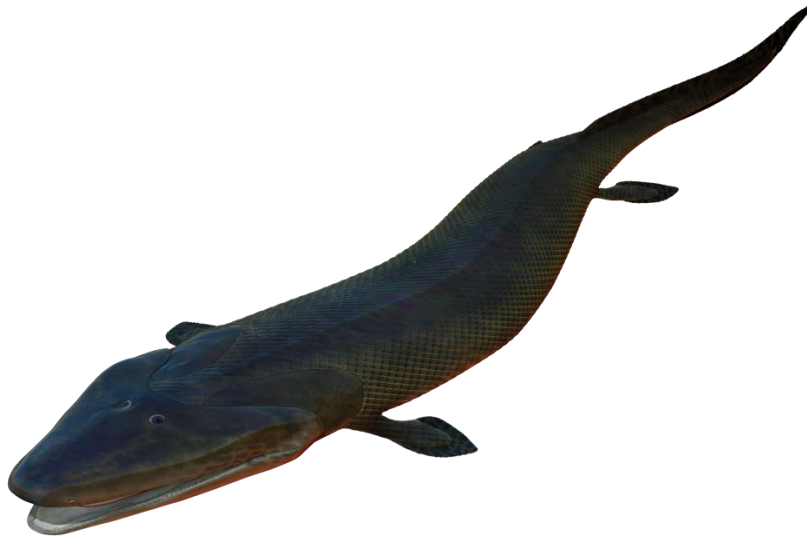
Mark Martindale and John Finnerty have examined sea anemones and discovered something remarkable. They searched the sea anemone to discover a gene that looked like what we experience, as humans, as the belly-to-back gene. They discovered many different belly-to-back genes in the sea anemone (remarkable for a creature that does not appear to have either a belly or a back). This was a puzzle until they cut the anemone in half and discovered an axis of symmetry. Called the directive axis, it seems to define two distinct sides of the creature, almost a left and right. (IF,115)

With the **fish** we can observe creatures with *backbones and heads*. Within the heads we observe something shared by every fish, amphibian, reptile, bird, and mammal on the planet. "All of them have hydroxyapatite-containing structures... teeth!" (IF75)

Such hard bones arose not to protect animals, but to eat them. With this, the fish-eat-fish world really began in earnest. First, big fish ate little fish; then an arms race began. Little fish developed armor, big fish obtained bigger jaws to crack the armor, and so on. Teeth really change the competitive landscape. (IF76)

**In the transition from fish to amphibians**, paleontologists discovered something most remarkable!

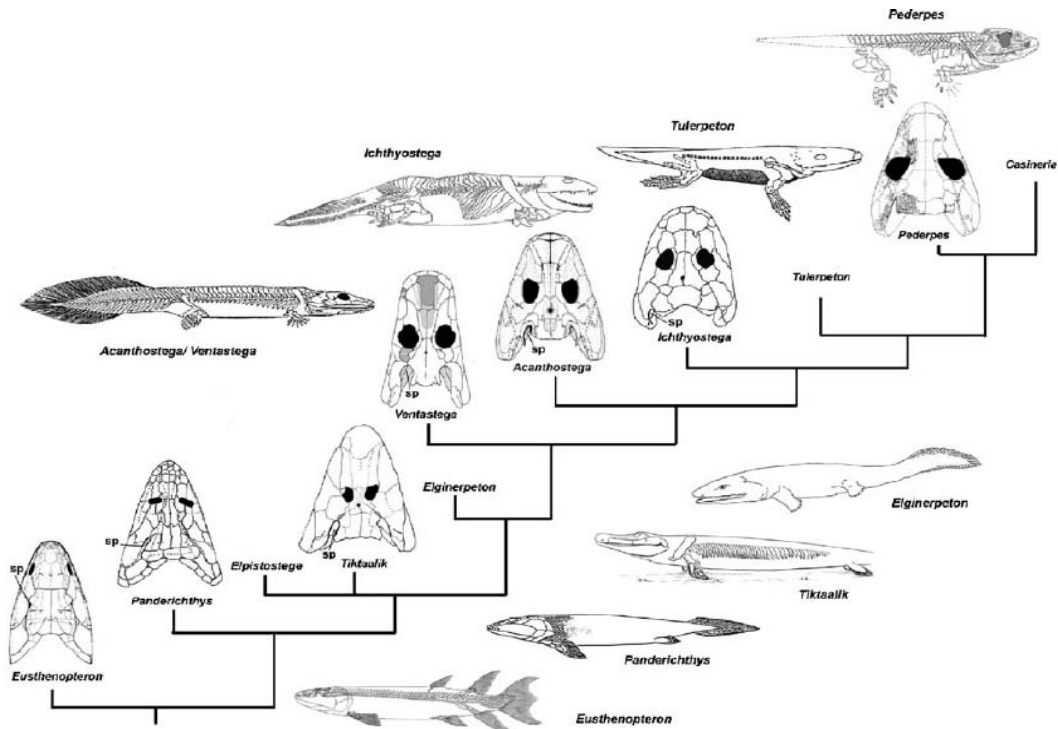
In the transition from fish to amphibians, a most interesting transition animal was discovered on Ellesmere Island in the Arctic north (by Neil Shubin and team). This fish, *Tiktaalik*, (Devonian, 365 MYA) has a shoulder, upper arm, elbow, forearm, and wrist composed of the same bones as an upper arm, elbow, forearm, and wrist in a human. (IF, 39)



When we observe **amphibians** with **backbones, heads, and limbs**,

All appendages, whether they are fins or limbs, are built by *similar kinds of genes*, such as those involved in shark fin development, in new ways to make limbs with fingers and toes. (IF58)

*The DNA recipe to build upper arms, forearms, wrists, and digits is virtually identical in every creature that has limbs.* (IF53)



As we move from the Shed Aquarium to the Lincoln Park Zoo, we can observe **reptiles** with *backbones, heads and limbs and the reptilian brain.*



In **the transition from reptiles to mammals**, paleontologists, again, discovered something most remarkable!

Under Bill's microscope was a tiny jaw, not more than half an inch long. In it were a few minute teeth. The jaw's owner was clearly a reptile, because the teeth had only a single root at the base, whereas mammal teeth have many (which you might have noticed if you ever have had a root canal). But on the teeth were tiny bumps and ridges that I could see even with the naked eye. Looking at the teeth under the microscope gave me the biggest surprise: the cusps had little patches of wear. This was a reptile with tooth-to-tooth occlusion. *My fossil was **part mammal, part reptile...** a trithelodont, a creature known from South Africa as well as now from Nova Scotia.* The trithelodonts were the gems because they showed that some kinds of reptiles already displayed our mammalian kind of chewing. (IF72)

Much of the story of mammals is the story of new ways of processing food, energy. Soon after we encounter trithelodonts in the fossil record, we start seeing all sorts of new mammal species with new kinds of teeth... By about 150 million years ago we find small rodent-size mammals with a new kind of tooth row, one that paved the way for our own existence. (IF73)





At the Lincoln Park Zoo we can also observe **mammals** with backbones, heads, limbs, hair, and breasts, and the mammalian brain.

**All of this we share with mammals, reptiles, fish, and jellyfish, as functional aspects of our own life blueprint.** Additionally, we enjoy an enlarged brain, the human brain, with expanded brain function.

All animals are the same but different. Like a cake recipe passed down from generation to generation – with enhancements to the cake in each generation – the recipe that builds our bodies has been passed down, and modified for eons. We may not look much like sea anemones and jellyfish, but *the recipe that builds us is a more intricate version of the one that builds them.* (IF,115)

## 2) The Cretaceous Extinction: Thank You Very Much!

This is truly a good news, bad news story. The bad news, no more dinosaurs. The good news, mammals, big mammals; that's us! At our museum, The Raymond M Alf Museum of Life we have a special interest in early mammals, which as you may know emerged during the Mesozoic, but stayed small lest they be the dinner of those big, carnivorous dinosaurs. Dinosaurs ruled for about 150 million years. Sometime around 65 million years ago, an asteroid 10 miles across, traveling at a speed of 50,000 miles per hour, crashed into our planet just off the Yucatan peninsula of what is today Mexico, creating a crater 100 miles wide. Imagine an asteroid a little smaller than Manhattan Island hitting the earth. Now imagine all the nuclear weapons ever created going off at once in one place, then multiply that by at least 1,000; that was the force of that impact. The effect of that impact turned the sky into a cauldron of sulfuric acid. It also triggered a magnitude 12 earthquake, which is a million times more powerful than a magnitude 6 earthquake. This, in turn, unleashed at least six mega tsunamis, which generated waves more than 300 feet high. A global firestorm incinerated as much as a quarter of the living biomass, releasing so much carbon dioxide that the average global temperature rose by at least 30 degrees Fahrenheit and stayed that way for a very long time. Whether it was the firestorm, the tsunamis, the acid rain, or the temperature, three out of every four species went extinct. What do you think: could we call this a tipping point?

*The Urantia Book* provides us no unearned knowledge; but it does say that “*biologically as well as geologically this was an eventful and active age on land and under water.*” (60:4.5)

## 3) The Frog that Made It: Bravo!

We are each the immense beneficiary of the frog.

*“From the briny waters of the seas there crawled out upon the land... frogs. 220,000,000 million years ago during the “Fern-Forest Carboniferous Period”... “the land was overrun by luxurious vegetation... the earth was overspread by vast forests of ferns one hundred feet high... silent forests; not a sound was heard, not even the rustle of a leaf, for such trees had no leaves.”* (59:5.6)

*Among the land animals the frogs reached their climax in the preceding age and rapidly declined, but they survived because they could long live even in the drying-up pools and ponds of these far-distant and extremely trying times. During this declining frog age, in Africa, the first step in the evolution of the frog into the reptile occurred. And since the land masses were still connected, this prereptilian creature, an air breather, spread over all the world. By this time the atmosphere had been so changed that it served admirably to support animal respiration. It was soon after the arrival of these prereptilian frogs that North America was temporarily isolated, cut off from Europe, Asia, and South America. (59:6.8)*

It would hardly be fair to speak of tipping points without pointing to the frogs. These amphibians learned about adaptation early on, being a creature of both land and water. The frogs turned their limitations to advantage: their tadpoles learned to prosper where little else might thrive. Their highly specialized tongue was the latest and best approach to an insect dinner. And, don't we know their back legs provided a wonderful method of escape!

You have been informed that Urantia mortals evolved by way of primitive frog development, and that this ascending strain, carried in potential in a single frog, narrowly escaped extinction on a certain occasion. (65:3.3)

You can hardly realize by what narrow margins your prehuman ancestors missed extinction from time to time. Had *the ancestral frog of all humanity jumped two inches less on a certain occasion*, the whole course of evolution would have been markedly changed. (62:3.5)

Thank goodness for powerful hind legs!

#### **4) The Reptilian Material Mind: Fearfully Wonderful**

Little do we appreciate the significance of the reptilian brain stem, that we all carry as part of our evolutionary legacy. The amigdyla, a crucial part of that brain stem, is the source of both our "fear factor" and our "compassion factor." Fight, flight, food, and \_\_\_\_ are the 4 Fs of existence that connect to our reptilian brain stem. Without these 4 Fs, none of us would be here now. So, a tip of the hat to our reptilian ancestors, thank you for the ambition of survival.

*140,000,000 years ago, suddenly and with only the hint of the two prereptilian ancestors that developed in Africa during the preceding epoch, the reptiles appeared in full-fledged form. They developed rapidly, soon yielding crocodiles, scaled reptiles, and eventually both sea serpents and flying reptiles. Their **transition ancestors speedily disappeared.** (60:1.9)*

*These rapidly evolving reptilian dinosaurs soon became the monarchs of this age. They were egg layers and are distinguished from all animals by their small brains, having brains **weighing less than one pound to control bodies later weighing as much as forty tons.** But earlier reptiles were smaller, carnivorous, and walked kangaroolike on their hind legs. They had hollow avian bones and subsequently developed only three toes on their hind feet, and many of their fossil footprints have been mistaken*

*for those of giant birds. Later on, the herbivorous dinosaurs evolved. They walked on all fours, and one branch of this group developed a protective armor. (60:1.10)*

*One hundred million years ago the reptilian age was drawing to a close. The dinosaurs, for all their enormous mass, were **all but brainless animals**, lacking the intelligence to provide sufficient food to nourish such enormous bodies. And so did these sluggish land reptiles perish in ever-increasing numbers. **Henceforth, evolution will follow the growth of brains, not physical bulk, and the development of brains will characterize each succeeding epoch of animal evolution and planetary progress.** (60:2.4)*

Neuroscience has only very recently offered many important insights into both the structure and function of the human brain. One of the most well-known models of brain structure, and how it relates to function, was provided by neuroscientist Paul MacLean, whose '**Triune Brain**' model is based on three dominant structures in the human brain. These three structures are often referred to as separate 'brains', due to the, now redundant, belief that they operate independently (while in fact they are simultaneously active in all circumstances). Those who subscribed to the triune brain model believed that the three major brain structures developed sequentially. First of all, 1) the basal ganglia, **the reptilian brain**, (found at the center of the human brain) was 'acquired', 2) followed by the limbic system, **the mammalian brain**, (which consists of various component brain structures, such as the amygdala and hippocampus), 3) then the neocortex, **the human brain**, (which is implicated in conscious thought, imagination, language and reasoning).

### **The Reptilian or Primal Brain**

In MacLean's triune brain model, the basal ganglia, the reptilian brain, are referred to as the reptilian or primal brain, as this structure is in control of our innate and automatic self-preserving behavior patterns (the *instinct of self-preservation*), which ensure our survival and that of our species. The primal brain is also in charge of, what are often referred to as, the four Fs: Feeding, Fighting, Fleeing, and... Reproduction (well, we won't use that other f-word here!). The basal ganglia and a number of the surrounding structures within the base of the forebrain are responsible for 'species-typical' behaviors, which are present in aggression, dominance, territoriality, and ritual displays. Notable behavior patterns include **defense** of self, family, and personal property, physical communication, and socially approved actions, such as handshakes, head nods, and bowing.

It's about the shape and size of an almond, nearly as old as the dinosaurs, to whose reptilian brains it bears a considerable resemblance. When you're walking home late at night, it's shouting out to you, bogging you down with panic as you navigate your way in the dark, ready to jump at every corner at whatever or whoever might be hiding there. It's there again when you've had it with your significant other and the wet towels they've left carelessly on the floor, or when you need that company report but your computer crashes the night before. Unfortunately, your twin amygdalae, found deep

inside your brain's temporal lobe, are here to stay, and you'll need to find a way to manage each time you find yourself ready to have a meltdown — however big or small it may be. The good news is that the amygdalae make up more than just your “reptilian brain” — in fact, that phrase hardly even needs to be taken as an insult.

## 5) The Mammalian Material Mind: Familial, Sometimes!

*Basic mammalian instincts began to be manifested in these primitive mammalian types. Mammals possess an immense survival advantage over all other forms of animal life in that they can:*

1. *Bring forth relatively mature and well-developed offspring.*
2. *Nourish, nurture, and protect their offspring with affectionate regard.*
3. *Employ their superior brain power (larger brains) in self-perpetuation.*
4. *Utilize increased agility in escaping from enemies.*
5. *Apply superior intelligence to environmental adjustment and adaptation.*

Next is the limbic system, also called the paleomammalian complex; the **mammalian brain**; or the midbrain. This part of the **brain is** unique to mammals. ... It developed very early in **mammalian** evolution to regulate the motivations and emotions that we now associate with feeding, reproduction, and attachment behaviors.

## 6) The Human Material Mind: Spiritual, Sometimes!

The neocortex is the newest part of the **cerebral cortex** to evolve (prefix *neo* meaning new); the other part of the cerebral cortex is the **allocortex**. The cellular organization of the allocortex is different from the six-layered neocortex. In humans, 90% of the cerebral cortex and 76% of the entire brain is neocortex.

For a species to develop a larger neocortex, the brain must too evolve in size so that it is large enough to support the region. Body size, basal **metabolic rate** and life history are factors affecting brain evolution and the **coevolution** of neocortex size and group size. The neocortex increased in size in response to pressures for greater cooperation and competition in early ancestors. With the size increase, there was greater voluntary inhibitory control of social behaviors resulting in increased social harmony.

On Urantia, owing to the unique nature of the life patterns, the lower adjutants experienced *far more difficulty in contacting with the evolutionary organisms* than would have been the case in a more standardized type of life endowment. (65:7.3)

With but a single exception, the adjutants experienced *the greatest difficulty in contacting with the evolving minds of Urantia organisms that they had ever had in all their functioning throughout the universe of Nebadon*. (65:7.4)

**7) “And this is why evolution – on Urantia or elsewhere – is always purposeful and never accidental.”** (65:0.4)

And so, we may observe the marvelous mechanisms of evolution as we stroll through the Shed Aquarium and the Lincoln Park Zoo. I doubt that you shall ever walk through an aquarium or a zoo with the same eyes. For all of this complex diversity, born from an underlying unity, we observe intelligent patterns of expression. We begin to see the power of the Cosmogentic Principle, infusing all creation with meaning and purpose. As we move into our depths spiritually we discover the unity of existence. *“God is Unity.”* (56:0.1) As we move into the breadth of our experience of creation we discover the magnificent diversity of divine expression. In combining that experience of depth and breadth we step through the door of our own autopoetic gift, a gift that is unique to each of us, and can be manifested only as we seek wholeheartedly for an appreciation of God’s will for our lives. Our only response to it all can be one of immense gratitude for all that is. Once again as Antony Flew, writes:

“**W**e have all the evidence we need in our immediate experience and only a deliberate refusal to “look” is responsible for atheism of any variety.” Antony Flew

As it is written in the revelation, and downstairs in the Life Carrier Hallway,

*The story of man's ascent from seaweed to the lordship of earthly creation is indeed a romance of biologic struggle and mind survival. Man's primordial ancestors were literally the slime and ooze of the ocean bed in the sluggish and warm-water bays and lagoons of the vast shore lines of the ancient inland seas, those very waters in which the Life Carriers established the three independent life implantations on Urantia.* (65:2.1)

## Appendix 1

# Nonfunctional Vestigiality

## The Appendix

In modern humans, the appendix is a vestige of a redundant organ that in ancestral species had digestive functions.

## The Tailbone

The coccyx, or tailbone, is the remnant of a lost [tail](#).<sup>[16]</sup> All mammals have a tail at some point in their development; in humans, it is most prominent in human embryos 31–35 days old.<sup>[18]</sup> The tailbone, located at the end of the spine, has lost its original function in assisting balance and mobility, though it still serves some secondary functions, such as being an attachment point for muscles, tendons and ligaments.

## Wisdom teeth

Wisdom teeth are vestigial third molars that human ancestors used to help in grinding down plant tissue. The common postulation is that the skulls of human ancestors had larger jaws with more teeth, which were possibly used to help chew down foliage to compensate for a lack of ability to efficiently digest the cellulose that makes up a plant cell wall. As human diets changed, smaller jaws were naturally selected, yet the third molars, or "wisdom teeth", still commonly develop in human mouths.<sup>1</sup>

## Ear

Right: The non-vestigial auricular muscle in the donkey can help it to move its ears like antennae. The ears of a macaque monkey and most other monkeys have far more developed muscles than those of humans, and therefore have the capability to move their ears to better hear potential threats. Humans and other primates such as the orangutan and chimpanzee however have ear muscles that are minimally developed and non-functional, yet still large enough to be identifiable.<sup>[9]</sup> The outer structure of the ear also shows some vestigial features, such as the node or point on the helix of the ear known as Darwin's tubercle which is found in around 10% of the population.

## Eye

The plica semilunaris is a small fold of tissue on the inside corner of the eye. It is the vestigial remnant of the nictitating membrane (the third eyelid), an organ that is fully functional in some other species of mammals.

## Gills

Humans never have "gills", and our "gill slits" don't normally open up the way that fish gill slits do. But we definitely do have the same basic structures, the pharyngeal arches, that go on to form gills in fish. We've just evolved to modify them for purposes other than extracting oxygen from water.

## Musculature

A number of [muscles](#) in the human body are thought to be vestigial, either by virtue of being greatly reduced in size compared to homologous muscles in other species,

by having become principally tendonous, or by being highly variable in their frequency within or between populations.

### **Behavioral**

**Goose bumps** are an example of a vestigial human reaction to stress.

Humans also bear some vestigial behaviors and reflexes. For example, the formation of goose bumps in humans under **stress** is a vestigial **reflex**; a possible function in human evolutionary ancestors was to raise the body's hair, making the ancestor appear larger and scaring off predators. Raising the hair is also used to trap an extra layer of air, keeping an animal warm. Due to the diminished amount of hair in humans, the reflex formation of goose bumps when cold is also vestigial. The palmar grasp reflex is supported to be a vestigial behavior in human infants. When placing a finger or object to the palm of an infant, it will securely grasp it. This grasp is found to be rather strong.<sup>[71]</sup> Some **infants**—37% according to one study—are able to support their own weight from a rod, although there is no way they can cling to their mother. The grasp is also evident in the feet too. When a baby is sitting down, its prehensile feet assume a curled-in posture, similar to that observed in an adult chimp. An ancestral primate would have had sufficient body hair to which an infant could cling unlike modern humans, thus allowing its mother to escape from danger, such as climbing up a tree in the presence of a predator without having to occupy her hands holding her baby.

### **Hiccups**

It has been proposed that the hiccup is an evolutionary remnant of earlier amphibian respiration. Amphibians such as tadpoles gulp air and water across their gills via a rather simple motor reflex akin to mammalian hiccuping. The motor pathways that enable hiccuping form early during fetal development, before the motor pathways that enable normal lung ventilation form. Thus, according to recapitulation theory, the hiccup is evolutionarily antecedent to modern lung respiration.