

## HUMAN GROWTH AND DEVELOPMENT, AND THERMO II

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*A brief explanation of the two laws of thermodynamics is presented. Thermo II applies only to open systems, since there is no such thing in the real world as a closed system. The four criteria for increasing order in a system are presented by comparing a building, growing plant and growing animal. The failure of the evolution model to provide for a directing program and conversion mechanism to achieve order from disorder is noted, also the qualifying criteria for creative order and degeneration of the creation model was presented. Since the starting cell is more complex or at least equal in complexity than any cell in the mature organism, human growth and development are not violations of Thermo II. Although entropy is never zero, creationists should practice health fitness in order to decrease the rate of increase of entropy in their lives and to witness for the Gospel of Christ and its corollary doctrine of creation.*

### Thermodynamics in a Nutshell

Thermodynamics is a branch of science that "is concerned with the relations between heat and mechanical energy or work, and the conversion of one into the other."<sup>10</sup> Historically, it developed from the study of converting heat by heat engines into mechanical work which is the basis of our modern industrial operations. It is of prime importance to the various models of origin.

The study of thermodynamics has resulted in the promulgation of two physical laws of nature: the first law of thermodynamics (Thermo I) and the second law of thermodynamics (Thermo II).

Simply stated Thermo I declares "energy can be neither created nor destroyed: it is transferred from one place to another many times changing its form." In other words, the loss of energy anywhere is always accompanied by an equal gain of energy someplace else. In the total view, the energy of an isolated system always remains constant. The totality of matter and energy is always conserved. When some form of matter is converted to energy, e.g., the Einstein equation  $E = mc^2$ ,  $c$  being the velocity of light, the matter is not destroyed but merely transformed into some other form of energy.

Thermo I correlates neatly with the creation model. The reason why no energy can now be created is because only the Creator, the Divine Intelligence behind the universe, can create energy. This Creator has revealed to us that He has "rested from all His work which He created and made" (Genesis 2:3). The reason why energy cannot now be destroyed is because the Creator is now "upholding all things by the word of His power" (Hebrews 1:3). The writer of Ecclesiastes (3:14) alludes to Thermo I: "I know that, whatsoever God doeth, it shall be forever: nothing can be put to it, nor anything taken from it."

Thermo II is sometimes called the law of increasing entropy. Entropy is a thermodynamic quantity that measures the randomness of a system — the greater the randomness (disorder) within a system, the greater the entropy.<sup>14</sup> Simply stated, whenever there is an energy transformation, there is a loss of usable energy. Lindsay clarifies this law as follows: "There is a general natural tendency of all observed systems to go from order to disorder, reflecting dissipation of energy available for future transformation — the law of in-

creasing entropy."<sup>4</sup> According to Prigogine: "Entropy, in short, is the measurement of molecular disorder. The law of the irreversible increase in entropy is a law of progressive disorganization, of the complete disappearance of the initial conditions."<sup>9</sup>

Heat will naturally flow from a hot object to a cold object, but not from a cold object to a hot object. This is because in order for work to be accomplished, the available energy has to flow from a higher level to a lower level. When it reaches the lower level, the energy is still in existence, but no longer available for performing work. This is an example of the total irreversible flow of heat in quantitative terms. For this reason, no natural process can be 100% efficient, with all of the expressed energy converted to work. Some energy must be used to overcome friction while other amounts of energy are given off as heat. For the non-scientific layman, this means there is a natural law, proven both by statistics and experience, that causes all systems to "evolve" from order to disorder or complex to simple.

Thermo II is devastating to the evolution model as it infers that evolution in the vertical direction, i.e., from one degree of order and complexity to a higher degree of order and complexity, is highly improbable. Entropy is in direct contradiction to the "natural increase in order" necessary for the veracity of the evolution model.

Most evolutionists tend to ignore the damaging effect of entropy to their model of origins; others seek refuge in an "open system" argument. They argue that Thermo II applies only to closed systems from which external sources of information and energy are excluded. They argue that the earth and its biosphere are open systems with a free supply of solar energy and other environmental conditions. They claim there are examples of systems increasing in order and complexity — such as the development of a crystal from a solution, the growth and development of a seed or embryo into an adult plant or animal or the development of a primitive culture into a large complex modern culture — as evidence that Thermo II does not always prevent the development of higher-ordered systems. None of these examples is a proof that entropy is not always in effect. Crystal are not the same as highly-ordered organic molecules. These "dead-end" crystals actually contain less "information" than the solution from whence they came. It is questionable whether they are an "advance" to a higher chemical

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level. Also, the growth from seed to plant, embryo to adult animal and primitive culture to technological culture are not examples of the violation of the law of entropy as will be demonstrated later in this paper.

The "open system" argument of evolutionists is invalid as Thermo II applies only to open systems, since there is no such thing in the real world as a closed system. Layzer has pointed out that "Borel showed that no finite physical system can be considered closed."<sup>3</sup>

Morris has proposed a comprehensive definition of Thermo II: "In any ordered system, open or closed, there exists a tendency for that system to decay to a state of disorder, which tendency can only be suspended or reversed by an external source of ordering energy directed by an informational program and transformed through an ingestion-storage-converter mechanism into the specific work required to build up the complex structure of that system."<sup>6</sup> He further stated: "If either the information program or the converter mechanism is not available to that 'open' system, it will not increase in order, no matter how much external energy surrounds it. The system will decay in accordance with the Second Law of Thermodynamics"<sup>7</sup>

#### Is Human Growth and Development a Violation of Thermo II?

Some evolutionists claim that Thermo II does not apply to living systems. They are motivated by their zeal to claim an entropy decrease during the growth and development of living organisms. They claim that during growth and development there is a definite increase in cellular order and complexity. Growth of a cellular organism can occur in two ways:

1. hypertrophy — increase in cell size
2. hyperplasia — increase in cell number

In both of these processes the complexity and genetic information necessary for growth was initially within the original cell (zygote) of the organism. The original cell in no way acquires this order from any extracellular source. The capacity to achieve maturity is inherent in the starting state of the original cell. Therefore, the starting cell must be more complex or at least equal in complexity than any cell in the mature organism.

Most creationists hold that the original living organisms were created fully grown. As generations of organisms were reproduced, there was an attempt to replicate the original created order. From the initial

**Table 1. Creative Order and Degenerative Theories for Creation Model**

Criteria	All Living Organisms Creative Order	Degenerative Processes
Open System	All Forms of Matter and Life	All Forms of Matter and Life
Available Energy	Supreme Being's Creative Energy (Thermo I)	All Forms of Matter and Life
Directing Program	Supreme Being's Will (DNA Genetic Codes)	Thermo II (Law of Entropy)
Conversion Mechanism	Supreme Being's Creative Powers	All Energy Conversion Processes

to the final state there is no increase in order. Original order is at best being duplicated. When sin entered the world, the disordering effects of Thermo II started to reduce the order in successive generations by mutations.

McDowell, arguing from information theory, stated: "The total information implicit in all the bodies (including the total information coded upon the genes which they carry) of all creatures which have lived since the original creation, live now, or ever will live upon our planet cannot exceed the total information coded upon all our genes of all of the creatures which came into being at the original creation."<sup>5</sup>

From this standpoint growth, both hypertrophic and hyperplasmic, cannot be considered a violation of Thermo II or an increase in complexity of the organism. The original order (full-grown adult organisms) with their DNA directing programs had to be created by the intelligence of the Divine Designer. Table 1 presents the creative order and degenerative theories for the Creation model.

To put it another way, the increase in order from the observations of growth and development is only apparent and not real. The zygote (fertilized egg) is as complex, or more so, than any future cell in the growing organism. All of the coded information needed for the production of the adult is present in the zygote. No new information is required or added. It appears that almost from the moment of conception, loss of information and order by means of mutations results in the start of various degrees of wear and tear on the cells. This loss of order, or the rate of increase in entropy, may slow down during growth and development, but it never ceases. Evolutionists erroneously tend to believe that this decrease in the rate of increase of entropy is actually a total cessation of increase.

After a certain "peak time of life" is reached by an adult organism in which there is a very small rate of increase of entropy, the rate of increase of entropy accelerates. This is manifested by what we call the "aging process" and finally culminates in death, whereupon the organism attains its maximum state of entropy — a pile of dust.

Williams, a creationist authority in thermodynamics, classifies natural processes into three categories:

1. improvement processes — structures get better and more complex
2. conservative processes — structures remain the same
3. degenerative processes — structures get worse and become disordered<sup>12</sup>

Information theory casts doubt on the possibility of any improvement processes under naturalistic conditions. Therefore, all natural processes that are observed are either conservative or degenerative processes. Both reproduction and growth are conservative processes.

Reproduction merely guarantees conservation of kind. Scientists may never agree on the exact definition of kind (Genesis 1:11, 12, 21, 24, 25); but whatever it is, it was to reproduce itself. Essentially, living organisms were meant to be preserved on this earth through reproduction. Therefore, the activity of reproducing is conservative.

Likewise, in an attempt to preserve the original created order both hypertrophic and hyperplasmic growth are conservative processes. During growth to maturity the organism is simply replicating to a limited degree the original created order. "As the number of organisms increases, the quantity of order increases but not the quality."<sup>13</sup>

### The Natural War in Nature — Conservation Versus Degeneration

All through the life of an organism, created order is eroded by various degenerative processes. Conservative processes, however, tend to counter degenerative process, but at best, they can only physiologically "hold even" with the "wear and tear" of degenerative processes. Physical exercise and training have a positive effect on many tissues and bodily systems, but still there is some energy waste during the metabolic processes. It is true that proper nutrition, exercise and rest can have a beneficial health effect on the human individual, but the long-term overall net trend is one of slow degeneration. Even the most pure and disciplined athletes will eventually "wear away and die" because of the natural supremacy of degenerative processes over conservative processes.

The food chain is an attempt to achieve conservation. However, there is a long-term loss of conservative results as the chain is extended. A cow eats thousands of pounds of grain or vegetation to provide man with a few hundred pounds of beef. The energy transfer from plants to protein-in-cow to protein-in-man is a wasteful process. Humans attempt to maintain health through nutritional ingestion, yet our physiological processes are so inefficient that a large amount of the food we eat is thermodynamically wasted.

What may appear to be improvement is in actuality the result of conservative processes overpowering degenerative processes. There is no structural or functional improvement as any apparent improvement would have to result through genetic recombination or some positive change in a cell's directing program.

### A Plug for Christian Stewardship

Intelligence and common sense can facilitate conservative processes. Man has conquered some diseases and has the ability to prevent many other diseases that would eventually destroy him.

The creation model starts with the premise that matter and life were created perfect, but since sin entered the world, matter and life are not improving naturally, as evolutionists erroneously believe, but in reality are degenerating. During our early lives, conservative processes may decrease our rate of increase of entropy, but we still have some loss of usable energy although it may not be apparent. At a certain time in life called "physiological maturity" we reach the point of lowest entropy rate, and we appear to be at "peak health." After this peak time of metabolic efficiency is reached, the degenerative processes increasingly outperform the conservative processes. This sudden "downhill trend" is what we recognize as "the aging process."

Therefore, the creationist is concerned about conserving the efficiency of his physiological processes,

because he wants to serve his Creator and fellowman. This should be the incentive and provide motivation to be a good steward of his bodily structures and functions. He also has the command of his Savior to strive for perfection in all things (Matt. 5:48). This can best be done by following the formula for health fitness:

$$\text{Personal Health Fitness} = \text{Nutrition} +$$

Exercise + Rest - Stress - Drugs - Pollution which was discussed in detail in a previous paper.<sup>2</sup> If we are to spread the truth of creation and the Gospel of Christ to a doubting world, we must "walk the way we talk." We must nurture conservative processes and inhibit degenerative processes in our personal and professional lives. It is my hope and prayer that each reader do his best to inhibit the effect of Thermo II and promote healthful growth and conservation in his life.

### Can Thermo II Be Overruled?

Thermo II is overwhelming in its natural tendency to direct nature and life from order to disorder. How do Neo-Darwinian evolutionists deal with this? They commonly by-pass it with the simple statement that the earth is a system open to the energy of the sun, and this proclamation resolves the problem. This response is totally inadequate as much more is needed than an open system and available energy to produce order from disorder. There are four essential criteria that must be met in order to supersede Thermo II and produce order out of disorder. These criteria are:

1. an open system
2. available energy
3. a directing program (code)
4. conversion mechanisms

The evolutionist argument fails to supply the necessary directing program and conversion mechanisms for the overpowering of Thermo II and production of complex materials and life from simple materials.

Table 2 demonstrates how buildings, plants and animals increase from disorder to order using the four criteria. We are all familiar with the way a building is built, and we know that if any one of the four criteria is not met the building will not be built. The same goes for the growing plant or animal.

**Table 2. Criteria for Increasing Order System**

Criteria	Building	Growing Plant	Growing Animal
Open System	Construction Materials & Environment	Seed & Environment	Zygote (Fertilized Cell) & Environment
Available Energy	Electrical & Mechanical Energy & Manpower	Sunlight	(Proteins, Fats, Carbohydrates—ATP)
Directing Program	Architectural Blueprints	DNA Genetic Code	DNA Genetic Code
Conversion Mechanism	Workmen & Equipment	Photosynthesis	Hyperplasia & Hypertrophy (Messenger & Transfer RNA, & Enzyme Activity)

Table 3 demonstrates the failure of the evolution model of origins to provide for all the criteria necessary for order to result from disorder in the case of

the first living molecule and a population of complex organisms.

**Table 3. Disorder-to-Order Theory for Evolution Model**

Criteria	First Living Molecule	Population of Complex Organisms
Open System	Complex Inorganic Molecules	Population of Simple Organisms
Available Energy	Sun	Sun
Directing Program	None Known	None (Natural Selection???)
Conversion Mechanism	None Known	None (Mutations, Crystals, Growth of Plant or Animal???)

The evolutionists have a real problem. For how can unordered, unthinking, non-living chemical elements be combined naturalistically into an extremely sophisticated ordered information system? Angrist and Hepler present a balanced view of the problem:

"Life, the temporary reversal of a universal trend toward maximum disorder, was brought about by the production of information mechanisms. In order for such mechanisms to first arise it was necessary to have matter capable of forming itself into a self-producing structure that could extract energy from the environment for its first self-assembly. Directions for the reproduction of plans, for the extraction of energy and chemicals from the environment, for the growth of sequence and the mechanism for translating instructions into growth all had to be simultaneously present at that moment. This combination of events has seemed an incredibly unlikely happenstance and often divine intervention is prescribed as the only way it could have come about."<sup>1</sup>

These authors admit that the doctrine of evolution cannot come up with any plausible sources for a directing program or conversion mechanisms that are required for the first self-assembling of the first living organism. In the wonderland of evolutionary thinking — plans draw up themselves, mechanisms design themselves, auto-catalytic conversion mechanisms appear and life generates itself!!! In the real world, every effect must have a cause. Yet, evolutionists call creationists unscientific and anti-intellectual, because they postulate an adequate cause (divine intervention) to account for the marvelous phenomenon of life.

#### DNA and Information Theory

Deoxyribonucleic Acid (DNA) is the molecule of heredity, and proteins are the basic molecules of structure and function. Both DNA and protein are combinations. In all living systems a directed, inherited sequence of bases of DNA molecules directs production of the specific sequence of amino acids characteristic of each kind of protein. It is this directed information inherent in the DNA molecule that causes proteins and other chemicals to grow and have metabolism. Evolution argues that through time, chance probabilities cause these unthinking molecules to react correctly for growth and development to occur. They claim that living systems can be derived from random,

spontaneous chemical processes. However, left to time, chance and their own natural, chemical tendencies, DNA and protein react in ways that *harm or destroy* a living system and prevent any postulated "evolving" of life. Parker claims that "natural cross links between DNA and proteins contribute somewhat to gene inactivation during aging, and base-amino acid reactions are part of the wholesale chemical catastrophe that occurs in a dying cell."<sup>8</sup>

Yet, once living systems are created and the programmed DNA-protein relationship is established, living cells, which are coordinated sets of non-living molecules, continue to multiply, after their kinds in understandable and predictable ways that certainly violate no laws of chemistry. Given a living cell with favorable environment (open system), sunlight or nutrients (available energy), the DNA genetic code (directing program) and a set of coordinated (not random) translating molecules (conversion mechanisms), living cells use the DNA informational program to continuously make proteins which, in sequence, regulate other cell activities, growth and even the replication of DNA in reproduction. The ability of a living cell to grow, develop, react and reproduce does not derive itself from the properties of the molecules involved, but from the unique features of its directing program (DNA code) and conversion mechanisms (messenger and transfer RNA, ribosomal activity and amino acid activating enzymes or photosynthesis).

Protein synthesis, growth, development and reproduction do not just occur by random reactions. Without a highly organized directing program and precise conversion mechanisms, the cell would have no chance for development and function. Just as the original plan of a building is preserved by the human architect in the drawings and specifications for the building, so the plan of the cell has been stored by the Master Architect in long molecules of DNA inside the cell's nucleus. The DNA molecules act as genetic blueprints, and the precise arrangement of atoms in the DNA molecules contain all of the exact specifications for the construction of all cellular parts. The DNA molecule is somewhat analogous to a language, with four groups of atoms acting as its alphabet. These groups of atoms are arranged in three-letter "words," resulting in a total vocabulary of some 64 words. Sentences in the DNA language system can range from 50 words to hundreds of words in length. During the process of protein synthesis each DNA sentence is translated into a specific protein compound. To make a particular protein, specific enzymes inside the nucleus make a copy of a DNA sentence. The copy, itself a molecule of ribonucleic acid (RNA), migrates out of the nucleus to special organelles called ribosomes, which are able to "read" the nucleic acid language. The reader (ribosome) travels along the RNA molecule, and as each nucleic acid word is read, a particular molecule is added to the growing chain of protein. When the ribosome reaches the end of the RNA sentence the protein is completely synthesized, and it can perform its specific function in the cell.

The salient question is: how did this precise directing program originate? The plan for a building originates in the intelligence of the human architect. Since

no building ever produced itself by random methods over a long period of time, is it plausible to postulate that the directing program in the DNA molecule of the first living cell or groups of living cells was self-produced by random methods? To the rational mind, operating on observable evidence alone, it is much more plausible to believe that this wonderful cellular planning and development was produced by a Divine Designer.

Neo-Darwinism claims that during the original biogenesis of the first living organism the production of information from non-information occurred. Yet, it is common knowledge that according to information theory, codes and simulated information can never arise spontaneously from non-information.

It is clear that cellular chemistry is in no way random in nature, for it is most strictly controlled by "information chemistry" — the chemistry which is directed by codification and information inside the genes and not by random occurrences. According to Wilder-Smith "Codification and information exclude chance and disorder in cell chemistry. Thus the planlessness of Darwinian primeval cell chemistry is eliminated by the planned cell chemistry of codification."<sup>11</sup> Evolution lacks a scientifically acceptable explanation of the source of the precisely planned codes within

cells without which there can be no specific proteins and hence, no life.

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- <sup>13</sup>*Ibid*, p. 13.
- <sup>14</sup>Williams, Emmett L., ed., 1981. Thermodynamics and the development of order. Creation Research Society Books, 5093 Williamsport Drive, Norcross, Georgia 30071. See Section II for some thoughts on the significance of order.

## A TEST OF THE GENERAL PRINCIPLE OF CREATION

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A recent paper suggested a set of three biological principles for creationism.<sup>1</sup> The first of these is the General Principle of Creation which states that, "increasing levels of complexity of an organism requires increasing amounts and/or detail of information." This principle, like all scientific principles, is tested as to its validity by its conformity to the observed data and its power in making predictions. This paper will test the validity of the General Principle of Creation by comparing it to some observations on the DNA of animals.

If the General Principle is correct we would expect to observe an increase in the amount of DNA in a cell as its level of organization increases. This is a reasonable expectation since the DNA is the information containing portion of the cell and the General Principle requires an increase in information with increased complexity. Thus we should find that animals containing organs have greater amounts of DNA per cell than those having only tissues.

First let us review the taxonomic classification of animals (Table 1). It is interesting to note that taxonomic classification is, at the higher end of the scale, based largely on the systemic organization. Thus the Subkingdom Protozoa consists of organisms which are free-living cells or which form colonies. As examples

consider the paramecium and the volvox<sup>2</sup> respectively. The Subkingdom Metazoa is filled with multicellular organisms and is divided into three branches. The first of these is the Mesozoa in which the organisms have tissues and the adult is a blastula (ball of cells). These organisms are endoparasites of invertebrates and have not been well studied. Consequently we will be more interested in the Branch Parazoa in which the organisms have tissues and the adult is more than a blastula. This branch is entirely filled by the sponges. The Branch Eumetazoa contain all animals which have organs and organ system construction and is divided into two grades. The first of these grades is the Radiata which contains animals which have radial symmetry such as the hydra, jelly fish, corals and sea anemones. The Grade Bilateria contains the remain-

Table 1. Taxonomic classification of animals

Classification	Morphology
Subkingdom—Protozoa	Cellular & Colonial
Subkingdom—Metazoa	Tissue, adult blastula
Branch—Mesozoa	Tissue, adult more than blastula
Branch—Parazoa	
Branch—Eumetazoa	Organ with radial symmetry
Grade—Radiata	
Grade—Bilateria	Organ system with bilateral symmetry

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