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CREATION BELIEF AND THE PARADIGM OF EMERGENT EVOLUTION

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Renewed attention on Darwin over the last few years has not brought to a halt the clash between belief in creation and the theory of evolution. In Christian circles, too, opinions clash. In this article, the author sketches the diverse positions of creationism, Intelligent Design, and Theistic Evolution. He formulates his reservations against these three approaches and suggests that both evolutionary science and the biblical faith in creation need to be re-examined. Over against philosophical materialism or naturalism, on which evolution theory is usually based, he introduces a theory of emergent evolution. The process of evolution had its starting point in physical reality but has shown stepwise novelties at crucial moments. In successive organisms, irreducible new ways of being came to the fore. Evolution includes chance, but the ascent to higher modal levels of being refers to plan and purpose in the phylogenetic development of life. Not in theory but in faith, we can see evolution and its ascending line as being embedded in the creation order. However, the creation message of Genesis 1 does not only concern what happened in the past. It is a dynamic motive and includes liturgical and prophetic references to a new world of shalom.

For a century and a half, two narratives about the origin of human beings and the world have held sway, the creation story of the Bible and the evolution account of Charles Darwin.[1] These two narratives have divided our modern society to the bone. In 2009, the year of remembrance of Darwin's birth in 1809, the discussions surrounding the two narratives erupted again in full force. In the streets of London the sides of buses proclaimed, "There's probably no God. Now stop worrying and enjoy your life" (and one Christian bus driver refused to drive one!). And in The Netherlands a Pro Life organization ("Schreeuw om Leven") delivered six million brochures house to house, warning against all things having anything to do with evolution.

One thing is clear. The Darwin year has fanned the flames of conflict between creation belief and evolution theory rather than put them out. In Christian circles, too, opinions varied widely. Creationism, Intelligent Design, and Theistic Evolution, remained as far apart as ever. Not without reason. In my book, *Purpose in the Living World? Creation and Emergent Evolution*, I have shown how these positions are deeply problematic. This article continues this line of thought. It has three parts. In the first section, I depict the three

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[1] This is a text based on a presentation I gave on January 16, 2010, at the study conference of the Stichting voor Christelijke Filosofie in Ede, Netherlands, to introduce my book *Heeft de evolutie een doel? Over schepping en emergente evolutie* (2009). In the present paper I focus on the English version, *Purpose in the Living World? Creation and Emergent Evolution*, Cambridge University Press, 2008 (*Purpose*). The translation was entrusted to Harry Cook, the eminent translator and editor of *Purpose*.

mentioned views. The second part opens an alternative route and introduces the key concept of emergent evolution. In the concluding section, I offer a new way of looking at the biblical creation story.

1. *Creationism: The conflict*

Creationism wants to stay close to the Bible. The American historian of science, Ronald Numbers, in his well-known and long-standing tome, *The Creationists* (Numbers 1992), has provided an authoritative description and analysis of this movement. In its standard guise creationism implies a literal view of the six creation days, a very young earth of six- to ten-thousand years old, the biological species as constant created kinds, and geological layers that, with all its fossils, have largely originated in the Noachian deluge.

Today's creationism is more accommodating than in years past. Often it is not the species that are marked as "basic types of life" or creational units; rather, categories above the species level are then regarded as these kinds.[2] Thus members of the horse family (Equidae) would be an unchangeable type of life, but within this type, species such as donkey, horse, and zebra would have evolved. Beside "young earth creationism" we also have "old earth creationism," a variant in which the creation days of Genesis are stretched to hundreds of thousands of years.[3] Stretched or not, creationists assume a basic conflict between creation and evolution.

Especially problematic are creationism's scientific aspirations. Numbers describes the history and claims of "scientific creationism." Empathy for the ancient Eastern narrative style, in which the Scriptures had its birth, is not one of creationism's stronger attributes. Scripture may be read as a guide for faith and life, but it is also employed as a scientific source of information and an encyclopaedic reference work. Thus, Genesis 1 functions as an archival account of the origin of the world, and the oriental world-picture that comes to expression in the text is often neglected. Creationism wants to base science directly on the Bible, and have the creation days serve as a framework for empirical research. In short, in creationism discussions about natural science necessarily set creation science in opposition to evolution science; there can be no compromise between the two.

2. *Intelligent Design: The synthesis*

The second major view is Intelligent Design (ID). It is a movement that has made advances in the United States since the nineties. It defends the thesis that some phenomena occur in living nature that cannot have developed by chance, but must have arisen out of an intentional design. This idea of a special

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[2] See e.g. Siegfried Scherer (1998). Scherer is a representative of creationism in Germany. See also Behe (2007).

[3] Old Earth Creationism is at present also influential within Islam. See the widely distributed work of Harun Yahya: *Atlas of Creation* (Yahya, 2007).

design in nature (and thus implicitly also of a designer!), that medieval scholasticism in its own way developed into a natural theology to support the theology of revelation, clashes with modern insights. It clashes especially with the Darwinian view that all phenomena of life have developed by chance through blind natural mechanisms such as mutation and selection. For this reason, the rise of Intelligent Design in the United States has led more than once to battles about public education.

ID's most prominent spokespersons, William Dembski and Michael Behe, gripped as they are by the idea of a design in living nature, hold to a nuanced point of view. They assume that many life forms can indeed be explained in an evolutionary way, but there are qualified exceptions. According to Dembski, some phenomena are so intricately wrought together that the explanation of their origin on the basis of random variation and natural selection is logically unthinkable and statistically untenable (Dembski 1998). Behe, in his approach, likes to point to the exceedingly complex design that lies at the basis of molecular processes that take place in the black box of the biological cell (Behe 1996). At times, these processes have such a complex and ingenious structure, in which no component may be lacking, that it simply cannot be understood how this structure could have evolved out of a simpler configuration; it is to be seen as irreducible. Thus there must have been an incidental intervention from a higher power, inserting this specified design into nature. Such intelligent designs would have been incorporated, to name a few examples, in the first living cell, in the flagellar motor of bacteria, in the blood clotting system of the vertebrates, and perhaps also in the formation of *Homo sapiens*. In short, the Intelligent Design movement also experiences the tensions we saw in creationism between creation and evolution, but with its challenging concept of an intelligent design it seems to make room for the notion of a creator. It seeks for a bridge, a synthesis between evolution and creation. See Dembski's work, Intelligent Design: *The Bridge between Science and Theology* (Dembski 1999).

The design theory, too, brings about reservations. Where, in all of nature, is one to encounter such a specified or non-reductive design? Thinkers in the design movement search for lacunae in the explanatory series of evolutionary science and subsequently designate a number of these lacunae as indications of an extra-natural or supernatural design. But how can this be the correct way to proceed in scientific discussion? How can science, beforehand, determine which phenomena science, despite its rapid progress, will never be able to explain? And can one then subsequently come forth with the concept of a non-earthly source or a supernatural design, or even with the idea of a supernatural designer, that can explain these gaps in terms of incidental, divine interventions? It seems to me to be a fruitless, yes, even dangerous enterprise. For, as science progresses and provides natural explanations — say for the flagellum of *Heliobacter pylori* (see *Purpose*, 133) — supernatural explanations, in terms of an incorporated design, become superfluous. Within the dualistic framework of a

natural and a supernatural domain, an ascent of science can lead in an instant to a descent of faith in the Creator.[4]

3. *Theistic Evolution: Compatibility*

Proponents of Theistic Evolution (TE), the third major view in the discussion about evolution, do not see a conflict between their faith in creation and evolutionary science, as is the case for creationists, nor do they strive for a synthesis between the two, as do the advocates for Intelligent Design. In *Purpose* I brought the opinions of TE into the discussion only as an aside (*Purpose*, 36), so I will go into more detail here.

The starting point of Theistic Evolution is that the insights of modern science are also a gift from God, and thus compatible with the creation narrative. Usually this compatibility is formulated in such a way that God created the world through evolutionary processes that occur in nature. To put it more precisely, God brought the world and human beings into existence by employing in His creative acting physical laws and evolutionary principles, such as chance variation and natural selection (Scott 1997 and 2000).

An author that illustrates this conflation of creation and evolution is Denis Lamoureux. He and other evangelical Christians prefer to speak about "evolutionary creation" (Lamoureux 2008) but this is only a difference in emphasis. With this term, Lamoureux wants to state forcefully that the world is a creation; the stipulation "evolutionary" is an additional qualification that indicates "the method through which the Lord made the cosmos and living organisms." Here, too, the starting point is that the belief in a divine creator is in harmony with the results of evolutionary research. Lamoureux adds: "The intention of the Bible is to teach that God is the Creator, and not how the Father, Son, and Holy Spirit created" (Lamoureux 2008, 35).

Theistic evolution raises all kinds of questions. How are we to conceive of the agreement that it claims for the relationship between the Bible and science? Are we to understand creation belief in Darwinian categories? Did God also call human beings into being through evolutionary means? And did even the human spiritual nature come into being through the blind mechanisms of mutation and selection? Some adherents of TE have a basic reservation here. For them, all living species would have developed phylogenetically, even the human body, but not the soul. God would have created the soul directly and have inserted it into the human body. This is the dualistic vision of the Roman Catholic Church, formulated by Pope John Paul II.[5] A similar opinion seems to be held by Francis Collins, Director of the Human Genome Project in the United States from 1993 to 2008, and since 2009 Director of the National

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[4] In my view, the dualistic distinction between a natural and a complementary, supernatural world, stemming from the thought pattern of medieval scholasticism, still plays its tricks with Intelligent Design theory.

[5] John Paul II is often included in TE. He states: "If the human body takes its origin from pre-existent living matter, the spiritual soul is immediately created by God" (1997, 383). See *Purpose*, 266-268.

Institutes of Health, but his view is unclear and contradictory.[6] In line with modern science, other adherents of TE reject this dualism of body and soul. But then the question immediately arises how truly human characteristics — like justice, morals, or trust in God — can have evolved from basic mechanisms in nature, such as the struggle for life, natural selection, and survival of the fittest, which could be stamped as selfish tendencies. Even more incisive is the question of whether the Creator himself, of whose presence Psalm 139 speaks so movingly, is not made more remote by this view of evolution. Is He degraded, wittingly or unwittingly, to an indirect cause?

In the last few decennia, Theistic Evolution has been worked out in rigorous detail in the theories of the Anglican scientist-priest, Arthur R. Peacocke, who died in 2006. Peacocke did not want to have anything to do with a conflict between creation and evolution, as accepted by creationists, nor with a possible synthesis, as proposed by Intelligent Design. In his emphatic vision, belief in God's creative activity and our insights into the evolutionary dynamic of nature go hand in hand. For "God is the immanent Creator creating in and through the processes of the natural order" (Peacocke 2004, 96).

Peacocke deliberately refuses to put the creator-God at a distance. But at what cost? He describes God as the permanently-present source of power of the entire cosmos. He subsequently asserts not only a harmony but a complete identification of what God does with what occurs in material and living nature. In his view, evolutionary science does the same thing as faith. It brings, in its own manner, God's acting in the world to light. In this way, Peacocke arrives at the famous conclusion expressed in the title of his book, *Evolution: The Disguised Friend of Faith* (Peacocke 2004). Nevertheless, I doubt whether this identification of creation and evolution brings us closer to the Biblical creation narrative. The theism of Peacocke results in what is called panentheism: God is in nature and nature is in God.[7]

In conclusion, let me refer to Theodosius Dobzhansky, one of the authors of the modern synthesis between evolution theory and genetics, and often referred to as a proponent of Theistic Evolution. Born into a Ukranian Orthodox family, Dobzhansky comes to a position that is very similar to Peacocke's identification of creation and evolution. Here follows a well-known quotation: "It is wrong to hold creation and evolution as mutually exclusive alternatives. I am a creationist and an evolutionist. Evolution is God's, or Nature's method, of creation. Creation is not an event that happened in 4004 BC; it is a process that began some 10 billion years ago and is still under way" (Dobzhansky 1973). What God does and what nature accomplishes come down to the same thing; we only use a different language.

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[6] Collins seems to be wavering between two opinions. First he remarks that "human beings are . . . unique in ways that defy evolutionary explanation." He remarks further that "God intentionally chose the same mechanism [of evolution] to give rise to special creatures who would have intelligence, a knowledge of right and wrong, free will, and a desire to seek fellowship with Him" (2006, 200-201).

[7] Panentheism (all things are *in* God) is to be distinguished from Pantheism (all things are God).

The compatibility thesis leads the proponents of TE, no matter how much they differ, to see creation belief and evolutionary science as two languages that develop alongside each other to disclose the secret of one reality. Both languages have their own concepts, rules, and intentions but they express themselves about the same reality. And that is good. Science offers method and insight; faith offers comfort and hope.

I already mentioned that the concept of theistic evolution evokes numerous questions, even if seen apart from the more rigorous opinions of Dobzhansky and Peacocke. Is creation to be explained in terms of evolution, and evolution in terms of creation? Somehow, the unification of both concepts breaks down. For Scripture mentions that God rested on the seventh day from all the work that he had done to bring creation into being (Gen. 2:2). But scientists do not mention anywhere that the evolution process has come, or shall come to rest. In fact, they assume the opposite. Not long ago, virologists were urging us to inoculate ourselves without delay against an evolutionary outbreak of Mexican flu.

In short, are creation and evolution to be seen as comparable entities, between which a fundamental agreement may be assumed; are they entities that may even coincide? In my view the compatibility of creation belief and evolution theory is not an obvious starting point; it is rather a task, an ideal to strive for. Thus, I leave the battle of Christian opinions and bring the critical question to order: how do we accomplish this task? How do we attain an integral view of the coherence of evolution theory and creation narrative?

4. *Is there a purpose in the living world?*

We have noted that creationism, Intelligent Design, and Theistic Evolution give rise to all kinds of reservations. Perhaps one can conclude that all these movements focus too much on what I would call the outer side of the debate. Too often they remain stuck on the age of the earth, the fossil record, the six creation days, the biblical genealogies, exegetical problems, questions about science and religion, and the like.

For many years I have been searching for something else, for the inner side of the evolution question. I tried to express this inner side in the title of my book, *Purpose in the Living World?* For here lies the central question, in my view. Is the living world a strictly random product of blind selection mechanisms, as many evolutionists would have us believe? Or is this world a creation, is it designed with a plan and a purpose, not in specified phenomena but on all points? That is, essentially, a question that touches us all in a deeply personal way. For it makes our own existence part of the discussion. Where does my own origin lie? Am I an unplanned result, coughed up by matter, an "accident" of Mother Nature, and could the evolutionary process also have peaked in an intelligent squid or in an extraterrestrial with sensorial tentacles? Or is my existence, no matter how humble, taken up in God's lofty intentions for this world?

I have often heard Herman Dooyeweerd say that the evolutionary question, given the content, is not a scientific but a philosophical issue.[8] Indeed, we cannot solve the problem by, on the one hand, consigning data from evolutionary biology and genetics in one pile while, on the one hand, leaving the results from scriptural exegesis and dogmatics in another separate pile. This would be to assume that different participants in the debate are trying to put the pieces of a puzzle together. No, what is needed is an integral conception, a philosophical totality view of the living world as a divine creation. Within this integral framework we have to give account of both the facts that evolutionary biology brings forward and the panoramic vistas that the Bible unfolds. Thus I come with the proposal to again think through, from an all-encompassing view, the evolutionary sciences as well as the Biblical belief in creation. We shall have to reset both science and faith.

5. *Evolutionary facts and evolution theory*

I begin with the sciences that confront us with evolutionary facts. The factual evidence that palaeontologists, biologists, embryologists, and biochemists have gathered over the last century and a half in favour of common descent, i.e. the common ancestry of all species, can be described as overwhelming. I cannot go into this right now, but see Collins (2006, ch. 4) and Klapwijk (*Purpose*, 71-72). Of decisive significance was the breakthrough in genetics: the discovery of the double-stranded DNA model by molecular biologists James D. Watson en Francis H.C. Crick in 1953. Since that moment it became clear that the genetic code of the DNA contained in all cells of living organisms is a truly universal language. This language is built up from the four bases adenine, cytosine, guanine and thymine, or one could say, A, C, G, and T; the code made up from these four bases varies from species to species and individual to individual. The language has now largely been decoded. It is virtually unthinkable that all biological species would be carriers of the same language- and information-code and not be related.

I admit, the proof that all organisms have a common genealogical origin can never be made watertight. For in the phylogenetic history, species have appeared and disappeared. And although the DNA of the hairy mammoth and Neanderthal man have now been sequenced, the genetic signature of almost all prehistorical creatures cannot now be reconstructed. Moreover, at times contradictions arise. I mention one intriguing example. The great apes — chimpanzee, orang-utan, and gorilla — have twenty-four chromosomes; human beings have twenty-three. That seems strange! Is the human species then still a notable exception, originated separately from the primates, a creature unconnected to all others? To the contrary, genomic biologists have discovered

[8] In a letter dated February 13, 1964 (of which I have a copy) to J.J. Duyvené de Wit, professor of biology at the University of Bloemfontein, South Africa, Dooyeweerd writes: "That so much misunderstanding [about evolution] arises and that it is so exceptionally difficult to make clear what these questions do, and do not, deal with, is due to the fact that the fundamental questions are of a philosophical and not a scientific-biological nature." (HC transl.)

over the last few decades that one of the human chromosomes, chromosome 2, is a combination, end to end, of two shorter chromosomes found in the chimpanzee. Structures (centromeres) in the center of human chromosome 2 reveal evidence of this prehistoric incident.[9] As one can see, even evidence against an evolutionary relationship, can sooner or later, turn into evidence for such a relationship.

Besides the evolutionary facts, let us also pay attention to evolutionary theory. For facts are never supplied in isolation. Every scientist wants to place the facts to be investigated in a larger scientific theory, and also has the inclination to include this theory in an even larger whole, a framework of philosophy or an over-arching worldview. Today, the philosophical framework that is brought forward publicly with great force is philosophical materialism. And it is brought forward with significant consequences for our view of life. The materialist states that living organisms have originated from lifeless matter. All biological systems are ultimately reducible to brute matter.

Reducible to brute matter? Darwin would not be quick to utter such a phrase. Species are derived from earlier species and these, in turn, from an original form of life. One cannot go farther. For this reason, Darwin concluded the sixth edition of *On the Origin of Species* with these profound words: "There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved." Some suggest that Darwin inserted the word "Creator" for the sake of his deeply religious wife, Emma, but I find this explanation inconclusive. Darwin was an agnostic, but he nevertheless wrestled with some obvious problems. If life stems from earlier forms of life, through variation, selection and survival, then how can the earliest life have originated? Surely not from lifeless matter that, strictly speaking, knows no variation or selection, and certainly no survival.

Dyed-in-the-wool materialists shove this problem aside. They do not accept a fundamental division between non-living and living nature. Everything derives from matter. Biological evolution has arisen from geological evolution, and the latter, in turn, from cosmic evolution. Evolution is a development that, indeed, manifests "complexification," an increasingly more complicated blueprint of matter. But this more complex matter is nonetheless matter, according to the materialist. Mind must be reduced to brain, and living organs to physical matter. But such a concept is more easily asserted than explained. For the first question is, how can above-physical phenomena such as mind, brain, and life be reduced to physical stuff, when one encounters these terms nowhere in the vocabulary of the physicist? A second question is, how can a physicist think about material things when thought itself is a purely physical interaction of

[9] As early as 1982, J.J. Yunis and O. Prakash pointed to the hidden analogies of human beings with the great apes and to the specificity of human chromosome 2. In the same vein, Francis Collins speaks about the fusion in the human DNA that must have taken place at some time (2006, 137-139).

brain cells and thus does not transcend matter? And then there is the question of truth. How can scientific statements, yes, how can even a materialist conviction, make claim to the truth when truth is not a transcending standard to which thought must conform but is merely the glitter of a material process?

6. *The paradigm of emergent evolution*

We must reset the evolutionary theory and consequently free ourselves from philosophical materialism. I have done that for myself in *Purpose in the Living World?* with the help of the discussed paradigm of emergent evolution. I want to briefly discuss what I have in mind with this paradigm. For a more detailed explanation, I refer the reader to my book.

Permit me to make a preliminary observation. Emergence theory is not one among many biological theories. I have brought it forward as a philosophical theory, a counterweight against materialism, an alternative philosophical construct to do justice to all the scientific disciplines that busy themselves with evolution in the intuitive realization that living processes naturally have a material basis without this being a sufficient reason for the belief that they are fully describable by material explanations.

In this section I wish to more explicitly examine the concept of emergence. I grant materialists that evolution is a rearrangement of matter into more and more complex structures. Thus the present-day cosmos is infinitely more complex than it was immediately after the Big Bang. And present-day living organisms are infinitely more complex than the unicellular life forms that covered the earth's crust long ago. Nevertheless, evolution implies more than complexification. When one analyzes the evolutionary process, one discovers that, besides an increasing complexity — that is, quantitative changes — qualitative changes also came to the fore. Darwin already described this qualitative newness of evolution as "descent with modification."

I propose that the word "modification" be taken literally. Evolution modi-*fies*. It caused a new mode of being to originate in inanimate things, an alternative, biotic way of being. For that is the amazing reality one encounters in the earliest history of the earth: something "emerged" which we now call "life." This life was not a new thing, not an additional substance, not an object hidden in, or connected with, already existing physical objects. It was, rather, a new way of being, of being active, which was entwined with the physical way of being and acting. That is to say, in philosophical terms: in the living cell the physical function was still present but it became subservient to biotic and perhaps even higher modal functions.[10] How this cell has been able to articulate itself as a multi-modal entity is difficult to reconstruct. But we must conclude that at a crucial moment in the evolutionary history, perhaps in the "black smokers" in

[10] The concept modal function I have indeed derived from the reformational tradition. However, this concept is not identical with the notion of a modal *aspect*. That terminology is specific for Dooyeweerd; Vollenhoven and others have always carefully avoided it. In *Purpose*, too, the term is absent. It is also unthinkable that above-physical aspects would emerge from an aspect such as the physical. Aspects assume, from the very start, each other's presence.

overheated deep-sea fissures of the arch-ocean, conglomerates of physical particles came into the grip of new modal laws, laws of life, and in this way took the opportunity to restructure themselves into unicellular organisms. By spontaneous self-organization and without losing their physical properties, they began to obey above-physical principles such as DNA-replication and reproduction thus developing in their milieu an appropriate body design and behaviour pattern.

Subsequently, this process of modification expanded. Besides bacteria, archaea, eukaryotic protists, and so on developed. When these biotically qualified organisms participated in further evolutionary processes and satisfied essential conditions for further developments, even higher modes of being could arise from them. Thus emerged, among other entities, plants, with properties such as growth and organ formation, animals, with functions such as sensitivity and perception, and human beings, with mental and moral competencies.[11] In short, the emergence paradigm implies continuity and discontinuity. At the basis, the evolution of nature developed gradually by an ongoing *complexification*. But at critical moments, the most complex organic systems became sensitive to an unexpected and non-predictable *modification* that manifested itself as a new mode of life at a supervenient level. In other words, the materialistic message of evolution as a monotone and continuous process of increasingly complex material structures is only half the story. We must add that in living nature, qualitatively new arrangements of being announced themselves, and they did so repeatedly at higher and higher levels. Nonetheless I hold to the ancient adage *natura non facit saltus*, nature makes no jumps. In each living being we find the results of emergent evolution in terms of discontinuous newness; yet, this newness is inextricably bound up with the basic functions of a continuous modal substrate. No discontinuity without continuity!

With the ascending series of innovative modifications, the evolutionary process also began to display purpose. To be sure, evolution often has a random course and an uncertain outcome. For example, at the end of the Cretaceous period, the Yucatan Peninsula received such a blow from a lost asteroid that numerous species perished through worldwide dust clouds, darkness and cold. The extinction of the dinosaurs created an opportunity for other species to flourish, the mammals being an important example. Randomness creates chances. Yes, viewed in a broader context, emergent evolution

[11] In an instructive review of my book, Tony Jelsma (2010) objects to this line of reasoning by suggesting that animal species should have preceded plants. However, the precise historical sequence of the plant and animal kingdoms, or the possible key position of the blue-green algae in the evolution process, is controversial and not at issue here. My considerations are not historical, based on the sequence of emergences in the phylogenetic process. They are systematic, oriented to the ontological hierarchy of levels, no matter how and when these levels revealed themselves in the evolutionary history. Evolution does not necessarily imply a linear progression, although I have to admit that some elementary diagrams in my book could more or less suggest this. Generally speaking, the evolutionary history should not be compared to a ladder, and neither, perhaps, with a tree. This history makes us think, in some respects, of a bush that is already branched at its root. I conclude that the history of emergence and the ontology of levels reflect each other partly and imperfectly.

indicates directionality and purpose. One mode of being, say that of a-biotic matter, became a substrate upon which new forms of being could arise, say that of cellular organization as in bacteria, of organic differentiation as in plants, of sensitivity and perception as in animals, and of logical reflection in *Homo sapiens*. In other words, higher and higher levels of organization developed in living organisms. The number of levels we are dealing with here we will leave aside for the moment. But at every turn a lower level became the platform on which a higher level could elevate itself. All in all, this ordering gives the evolution process a purposeful structure, even though the possible final purpose cannot be seen with the eye of science. (I shall come back to this point later.)

The emergence paradigm also shows why the evolutionary process has diverse tempos. Evolutionary change is usually gradual and extremely slow, at times at a seeming standstill. Today's red ant has a striking resemblance to the fossil ant caught in amber more than six million years ago. But evolution can reach a critical tipping point and accelerate. Darwin's idea of gradual change, gradualism, is, as far as that is concerned, extremely incomplete. The theory of punctuated equilibrium, of palaeontologists Niles Eldredge and Stephen J. Gould, is becoming widely accepted. They suggest that evolutionary stasis is punctuated by periods of relatively rapid change. Thus there are sudden interruptions in the slow course of the history of the earth. Significant qualitative changes in this history occurred during these interruptions, such as the origin of the first arch-cell, three and a half billon years ago, the proliferation of organisms in the Cambrian explosion, 530 million years ago, and the appearance of humanoid creatures, over six million years ago. The reasons for the incisive changes have not been clarified by the mentioned authors. Let me put it in my own words. Evolution is largely stasis, almost a standstill. But with the punctuations, evolution shows her emergent face. In these interruptions there occurs — I use the keyword of the French palaeontologist, Teilhard de Chardin — the phenomenon of "crossing a threshold."[12]

Emergent evolution also implies innovation. One can compare emergence with water that, once brought to a boil, evaporates. New functional properties then appear. But watch out, emergence makes a difference. For water and water vapour can both be physically explained; given temperature, atmospheric pressure, etc., properties such as fluidity and vapour formation alternate with regularity. But when life first stirred on earth, physical matter and life did not alternate at all. The first unicellular organisms were physical and biotic simultaneously. They retained a physical infrastructure but manifested, at the same time, supervenient traits which rose above this infrastructure, such as reproduction. Reproduction is a biotic function but is based on a physical substrate, such as the functioning of DNA molecules. The function of such molecules can be physically explained. But the question of how and why the DNA molecule carries information that serves reproduction transcends physics and touches the core of biology as a higher-level discipline.

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[12] See Teilhard de Chardin (1976, III.1.i). "We are separated by a chasm or a threshold which it [the animal] cannot cross" (1976, 166).

Here we see what is remarkable about emergent evolution. It doesn't confine entities to a one-dimensional material existence but it has, at crucial instances wonderfully produced a brand-new reality which is unpredictable and irreducible. It is a reality which is characterized — as Charlie D. Broad (1925), forerunner of emergence thought, once remarked — by novelty, unpredictability, and irreducibility. Emergence brought living nature on earth into being, bringing with this living nature a multitude of kingdoms and domains at increasingly higher levels of organization. Eventually, emergence realized a hierarchy of arrangements of being, a multi-dimensional ordering of being. In this amazing world, the human species stepped to the fore as a latecomer, material through and through and yet emphatically more than that.

7. *Idionomy*

In 2002 a book appeared by an expert in evolutionary complexity, Harold J. Morowitz, with the remarkable title, *The Emergence of Everything*. Morowitz distinguishes twenty-eight emergences, from the emergence of galaxies to the emergence of Neolithic people. In my book I am much more selective and distinguish a dozen levels of emergence. I leave the precise number open because my philosophy remains an open system. I gave a preliminary profile of emergent evolution above, but Morowitz's lavish applications make it clear that we need a more precise and critical definition. What is the specific characteristic of emergence? In my view it is idionomy, i.e. each emergent level is governed by its own distinctive laws. Emergent evolution implies that the evolutionary process in nature manifests itself in such a way that new arrangements of being appeared which were and are organized according to a regime of laws of their own kind.

Evolution biologists will object here that evolution is a random process, based on chance. To be sure, in the course of evolution chance processes such as variation and selection play a major role. But that does not mean that the end result will be random. To the contrary, viewed in a broader context, chance can serve a purpose; it can play a role in the realization of a plan. Every casino operator knows all about this. We see this servitude to a plan in the genesis of life on earth. Every new arrangement of being that has ever revealed itself in organisms and populations, disclosed the hidden architecture of the living world. At all these levels, organic systems began to present themselves with activities governed by laws. Thus, bacteria and other unicellular organisms are led by biological principles; plants, in addition, also follow vegetative principles; animal activities are especially governed by sensitive principles, and human beings profile themselves through mental and moral principles. Thus, in the long run evolution appears not as a chaotic but as a structured process of change. The systematics of the biological kingdoms developed by Linnaeus is witness to this, as much as the interdisciplinary cooperation between modern life sciences.

One of the weightiest arguments that have been brought forward against the idea of emergent evolution as a realization of idionomic levels is that it does not

explain how such levels came into existence.[13] I admit the latter without reservations; yes indeed, a causal explanation is lacking. Although the principles of Darwinian evolutionary theory, such as competition, variation, selection, and genetic transition, can explain gradual change, they do not explain the innovative breakthrough that is distinctive for emergence. Something similar can be said about the turbulences that molecular biologists have discovered to occur in the genome of species in the form of fusion, insertion, duplication, endosymbiosis and the like (see my example of chimpanzee and humans above). These disturbances in DNA do not offer an explanation for emergence either. Often they destroy the fine-tuning of the organism with respect to its environment and, much more often than not, they lead to the destruction rather than to the renewal of life.

Nevertheless, here too there is reason to widen our philosophical view. It could be that in specific circumstances phenomena such as natural selection and genetic turbulence favoured the elevation of life by creating the necessary conditions for an ordering of life at a higher level. Who knows, perchance they created, step by step, those conditions that made a particular organism or population at a fortunate moment receptive to a new system of rules and laws. In that case, the turbulences and transitions, while not the explanatory cause could nevertheless be a suitable occasion for crossing a threshold. They could form the substrate level upon which living systems could ongoingly reorganize themselves and subject themselves to new modal laws.

In the next section I want to return to this supposed receptivity of living creatures to higher laws. For the moment it should be clear that the reverse scenario — presenting molecular mutations and turbulences as a sufficient basis of explanation for emergence — has no benefit. For in that case emergence would no longer be emergence, for novelty, unpredictability and irreducibility would have been explained away. If life with its exuberant forms of expression is only an extension of inanimate matter, then we have lost our expanded view. We fall back to the tunnel vision of materialism.

I want to discuss a final question here. What is the significance of the idionomy of emergent levels for the status of biological species? Creationists like to see the species, on biblical grounds, as idionomic. In their view they are, one by one, the expression of a constant creational structure. Dooyeweerd comes to a comparable conclusion, not on biblical but on philosophical grounds. In his view the typical characteristics of a species represent its so-called "individuality structure." And this individuality structure has, just like the essence in platonic philosophy, the status of an unchangeable law. As a consequence of this "essentialism," each species is to be seen as a constant type, the expression of an unchangeable, law-governed identity structure.[14] In other words, in

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[13] In my book I elucidate why the theory of emergence is itself no explanatory theory. It is, rather, a theoretical framework, a philosophical or ontological framework in which the diverse explanatory theories of physicists, biologists, etc., level-bound as they are, can take their rightful place (*Purpose*, 161).

[14] In a plea for the typical nature and lawlike character of the biological species-concept, Dooyeweerd (1957, 97) observes, "We have observed that a *type*, as a *structure* of individuality, has the character of a law."

Dooyeweerd's philosophy idionomy is connected to the ancient doctrine of species constancy, even though the spiritual background is different. From the perspective of emergent evolution, I do not know where to go with this rigid form of idionomy.

Yet, species are not a flowing stream; they are not continuous with each other. Already in our everyday experiences, we recognize species as clearly distinguishable groups; they have their own "biotic character," as Dick Stafleu states (2006, ch. 22). To be more precise, a species is a reproductive community of its own kind and it has a relative durability. The song thrush sings differently from a nightingale. The many species of mangrove trees grow differently from the many species of conifers. Every species embodies species-specific laws. But this idionomy cannot be explained in terms of weighty, invariant *type structures*, different for every species; one would have to postulate millions, given the wealth of species in biological taxonomy. No, this idionomy is related to *modal structures*. Species are variable but relatively durable embodiments of a limited number of modal laws, such as we encountered earlier, on diverse levels of being. They are applications say of pre-biotic, biotic, vegetative, sensitive, and, as far as human beings are concerned, mental and moral laws.

That is why in *Purpose* I designate these modal laws as "germinative principles" (*Purpose*, 63, 122, 254). With this term I indicate that biological principles have a general point of departure, but also the tendency to take root in a particular reality. Take the biotic principle of heredity. No matter how general, this law is particularized in specific species. In hawkweed (*Hieracium*) it works itself out differently from peas. For the flowers of hawkweed, contrary to the flowers of the pea, can also form seed without pollination, something that Gregor Mendel, the father of genetics, had to learn from a series of failed experiments. Thus, species are in themselves no constant creational entities but variable applications of a limited number of modal germinative principles.

This may seem surprising, but it is not. One can compare biological principles with principles we identify in human life, for example in the economy or in morals. Constancy is also lacking in economic and moral principles. We do not know a standard economy and a universal moral, good for all times, places, and circumstances. Economic or moral principles are indeed germinal principles — the church father Augustine spoke of "seeds" — laws that have a general and unchangeable nucleus but that also adapt themselves through trial and error to the ambiguities of times and cultures. Such laws are concretized — some philosophers like to say "they have been positivized" — in market systems and moral institutions of divergent styles and relative durabilities. Examples are the pre-capitalistic and capitalistic market economies and the puritan and libertarian systems of morals (see Klapwijk 1994). In a similar way, I propose to consider biological laws to be modal laws with an extended variety of particularized applications. Through a process of trial and error over millions of years, these laws have resulted in that wealth of biological species that evolutionary theory brings to our attention as systems of relative durability.

8. *In the light of Genesis*

The theory of emergent evolution generates numerous questions. Why did molecular materials unite at one time to form prokaryotic and eukaryotic cells? Why did algae grow out to form vegetative organisms? Why did animals develop a sensitive inner side? How can an emergent phenomenon, if not be explained, yet be related to a preceding life form? Can one determine with precision how the series of emergences developed phylogenetically from matter to humankind? Last, but not least, how does emergence come about? If one were to assume that the hierarchy of emergent orderings is not produced by molecular mechanisms, does it then not become a castle built on air? Once again, we are confronted with the receptivity problem.

In my view, one cannot expect a well-worked-out answer to this problem from science. Often science can reconstruct how a facilitating pre-phase created basic conditions for the emergent life form. For example, cosmologists have concluded that, given the rapid appearance of life on earth four billion years ago, the required organic molecules must already have been present in cosmic space. But even if scientists can chart the facilitating pre-phase and organic material for a higher life form, they will not have satisfactorily explained the supervenient characteristics of the emergent phenomenon. To the contrary, emergence implies irreducible novelty. With the growing interest that today's scientists display for the "re-emergence of emergence" (Clayton and Davies 2006), we encounter again a puzzling secret: the problem of the final rationale of this emerging newness. Why did the world of dust and energy disclose itself into new worlds? Why did it become receptive to above-physical orderings? Numerous biologists today appeal to emergent properties and biological hierarchy. But Harry Cook (2010) confronts the issue: upon what do they base their vision of emergence and hierarchy? If scientists discover the paradigm of idionomic emergence without being able to render a rational account of its origins, don't we need to develop here, in this ultimate embarrassment, a view of emergence that is based on considerations of a totally different nature?

Let me be more specific. Until now, we looked at the problem of origins from the viewpoint of science. It is now time to look at the problem of origins from the viewpoint of faith. Perhaps it is necessary to not only re-set our scientific views but also our religious convictions. What can we state about the phenomena of evolution and emergence, in faith, and particularly in the light of the Biblical creation narrative?

9. *Creation and becoming*

I will first address the connections between Genesis 1 and 2. Theologians speak here of the first and second creation narrative. I would call this a fundamental misunderstanding. Genesis 1 (to 2:3) is indeed a creation message, an anthem to the majesty of the Creator. But Genesis 2 (from verse 4 on) is different. It is a

history in the sense of a message of becoming.[15] One should sharply distinguish creation and becoming. "Creation" refers to something coming into existence out of nothing. "Becoming" or "history" refers to a process of arising from something else, i.e. a process of change. God, who in Genesis 1 called the world and humans into being out of nothing, in Genesis 2 (from verse 4) brings human beings into existence out of something else. In fact, it reads, he moulded the first human being out of clay and breathed the breath of life into the nostrils. That is no creation; that is a history of becoming, told as a parable for the benefit of people familiar with ceramics. Hence my first conclusion: Genesis 1 is the touchstone for opinions about creation. But becoming flows out of creation: God created a world that is becoming. He wanted to display his manifold intentions with the creation in a history of becoming. Genesis 2 is the touchstone for becoming.

I would add this to elucidate the above. In the beginning, God created the heavens and the earth, i.e. the entire creaturely reality, as a world determined by his mighty word and orderings. Thus, God did not create only the initial material state of the cosmos — a popular misconception. No, his creating action is comprehensive. God created the earliest beginning and the continuation, as Genesis 1 clearly indicates. He established the cosmic universe but also the earthly reality, also the plant world, the animal world, and humanity, created after his image. Genesis 1 is not a story of origins or of a past that has gone forever. On the contrary, it includes us, and even the future, even if our mind can hardly comprehend this. The origin of the first human beings on earth only comes into the picture from Genesis 2 on. That is where the narrative of becoming begins, the story of God's walk with Adam and Eve and their offspring.

I now make a link with evolution. One does not encounter the modern concept, "evolution," in the Bible. But it is clear that what we now understand with "evolution" is not creation but becoming, not an instantaneous beginning but a derivation from something else. From this I deduce — my second conclusion — that creationist attempts to translate the evolution process back into the succession of the six days of Genesis 1 is doomed to failure. If one wants to relate the modern concept of evolution to the ancient text of Scripture, then don't relate it to Genesis 1 but to Genesis 2. Relate it to the humans that God, in his care for the created world, moulded out of available matter.

I draw a third conclusion. If Genesis 1 is a creation story and Genesis 2 a history of becoming, then the creation story provides a basis for the narrative

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[15] Genesis 2:4 opens with the words, "This is the account of the heavens and the earth when they were created" (New International Version). This is not a historical account as that is spoken of in modern historical science. The Hebrew word "toledoth" stands for births, generations, and lines of descent. Thus it refers to a genealogy or history of becoming.

Some Bible translations suggest that the above citation forms the conclusion of the preceding pericope, the creation story. But in doing so, they ignore the crucial difference between the creation message of Genesis 1 and the genealogy or historical account of Genesis 2. And they don't do justice to the Hebrew text either. In the Hebrew idiom, the toledoth structure of the sentence "This is the account of …." functions not as a conclusion for what has been said but as an opening clause for what will follow. See Genesis 6:9, 25:19, and 37:2.

of becoming. Then the creation order, i.e. the ordering of the creation, is determinative for the dynamic of becoming and for evolutionary processes that reveal themselves subsequently in that which is created. The creation order is, according to the Bible, instituted by God. Thus a believer has good reason to confess that the idionomy that we encounter in distinct levels of being — from matter to morals — is, in the final analysis, grounded in theonomy, i.e. in laws of the creator God.

Now I will state my last conclusion. Given this theonomy, the phenomenon of emergent orderings and purpose does not become a castle built on air by my rejection of materialism. Of course, we cannot imagine the grand spectacle of evolution on earth with its emergent adventures apart from the material stratum upon which it developed over four billion years. But looking through the eyes of faith, we see a world that is open to its Creator. Thus if this world, at crucial moments of its phylogenetic history, shows a fundamental receptivity to laws of a higher order and reorganized itself time and again accordingly, this receptivity has to be understood in terms of responsiveness. In the final analysis the temporal world, the world of becoming, is responding to divine orderings. So I conclude, there is indeed an ascending line of emergence and it must be seen as being embedded in the order of creation. Perhaps no-one has expressed this responsiveness to the creation order as suitably as my English friend, David Hanson who, in response to my book, said: "The evolutionary process is not pushed by molecular mechanisms but pulled by the creation order."

Bearing in mind the primacy of the creation order — in Calvin's words: Gods "law of creation" (1964: II.2.xvi) — it now becomes fully clear why I have difficulty with Dobzhansky and Peacocke who, as a rigourous consequence of the model of Theistic Evolution, fuse creation and evolution by positing that God creates (present tense!) by evolution. It also becomes fully clear why I have difficulty with Dembski and Behe who, according to their theory of intelligent design, see evolution as a process that is interrupted by incidental, creative interventions.

10. *Genesis 1 as a liturgical text*

Let me now focus upon Genesis 1, and the first verse: "In the beginning God created." My question here is: what does this "in the beginning" refer to? Is it a determination of time for God, or does it refer to us and our experience of time? Augustine's view is remarkable. God is not in time; to the contrary, He reigns over the ages. If there is time, it is created by God; it is indeed a creature of God. The eternal God created the world as a temporal reality in order to accomplish his plan and purposes with the world. In short, the "in the

beginning" is not a time determination for God but an indication for the benefit of us and our experience of time.[16]

Now we turn to verse 5 and what follows, where the creation days are spoken of. Here too, the question arises, what do these creation days refer to? A woman once remarked to me after a lecture: "I cannot be too concerned about these six creation days for in God's eyes, a thousand years are as one day." I agreed with her completely; see Psalm 90:4. The creation days, too, are not a determination of time that affects God; they affect us. We, human beings, are so enmeshed in time that the concept "creation" would be totally above our understanding if we could not picture the creation work of the Eternal in the refraction of time. As humans, we cannot think other than: first God did this, then that, and then that. Thus, the creation days are an accommodation of the Bible to the restrictions of our human imaginative ability. In a comparable context, Calvin sometimes speaks of God "accommodating" himself to the weakness of our understanding. In his *Institutes of the Christian Religion* he adds, just to be clear: "For who is so devoid of intellect as not to understand that God, in so speaking, stammers with us as nurses are wont to do with little children?"[17]

Are the creation days a helpful construct, a sort of teaching device for us? Not entirely! For why does the Bible speak of creation days, and not of creation weeks or years? Theologians answer that Genesis 1 is a literary document. It provides a literary framework. For them Genesis 1 is a sort of diary of God's creation acts.

I do not go along with this. Of course, Genesis 1 is literature, world-literature even. But this literary level is an unintended, unimportant feature. Genesis is, above all, a document of faith. But then why, from the viewpoint of faith, does Genesis 1 speak so explicitly about creation days and a day of rest? Exodus 20 gives the answer in the fourth commandment: "Remember the Sabbath day by keeping it holy." For when it says God created over six days and then rested on the seventh, this is given for us to follow. That is to say, the concept of creation days is not given to us as a literary but as a liturgical framework. It is the framework in which Jews, Christians, and Muslims the world over honour the Creator of heaven and earth. They want to celebrate God's creational acts with the help of workdays and a day of rest, every week anew.

Is this relevant for our topic? Certainly! If the creation days have liturgical implications; if they are meant to be a liturgical device for those who want to celebrate God's deeds of creation and commemorate them on special days, then they point us to the significance of ordinary week-days. Then they offer neither a scientific framework for Christian biologists nor a literary framework for theologians. Then it is just as unsuitable to make our evolutionary observations as our literary occupations a measuring stick for our understanding of Genesis 1. Then the creation days are held up to us as ordinary, average days, as

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[16] See Augustine (1961, XI. 13-14). Contrary to the main streams of philosophical thought in western philosophy since Parmenides and Plato, Augustine views time as an integral component of the world as it was created by God.

[17] See Calvin (1964: I.13.i), cited here in a paraphrase that is based on the original, Latin text.

classical creationists have proposed for many years. But we do make those ordinary days something special. In faith we consider them as days to celebrate and emulate.

11. *In a creational-messianic perspective*

In conclusion, I focus on two language fields. There is indeed, as the proponents of Theistic Evolution often remark, a language of evolution and a language of religion. The one offers explanation, the other prayer and praise. These two should be kept separate! But remember that the Word of God is like a double-edged sword (Hebr. 4:12). As a consequence its message in religious language has a critical impact upon evolutionary language. For evolution is not by definition a "friend of faith", as the monophonic views of materialists and naturalists clearly demonstrate. What is the message of the religious language of the Church through the ages? That the Creator rested on the seventh day and in this way invites us to follow Him and celebrate this day of rest.

This following of the Creator cannot be fulfilled with a weekly lighting of a candle in a church, i.e. with a liturgical fixation upon the past. For the New Testament explicitly exhorts the believer: "There remains, then, a Sabbath-rest for the people of God" (Hebrews 4:9). In short, the creation message is a dynamic motive. The language of Genesis stretches all the way to a day of rest in the future. It is simultaneously liturgical and prophetic language. It states that we, and all of creation, are on the move, pilgrims on the way to a Sabbath celebration in the City of God. We read the story of creation — a creation that waits "in eager anticipation" for the revealing of the children of God (Romans 8:19) — and at the conclusion we say "Next year in Jerusalem!" That's the reason why I already twenty-five years ago pleaded for rearticulating reformational philosophy in a "creational-messianic perspective" (Klapwijk 1987).

Now, if the pilgrimage to the city of God is indeed the point of the liturgy of our life, then it is now the time to reset. First we will reset the language of evolutionary science. We puncture the balloons of materialistic axioms and seek for moments of emergence and directionality in the process of evolution, even though the statements of the sciences never reach to the finish in shalom. We will also reset the language of our faith. We puncture the balloons of creationist chronologies and seek in our routine days for moments of liturgy, a liturgy, the peaks of which do indeed reach and refer to the finish in *shalom*.

Can creation belief and evolutionary science be united? Many stumble over this question, especially Christian young people. They give up, having become dejected or indifferent. It seems to be too big a step from the Bible to the biology lesson with its evolution theory. And where are the churches in all of this? Many still maintain a deafening silence. Yet it is not certain that evolution is without meaning and that human beings are an accident of nature. There is light on the horizon. But for saying this, it is essential that evolution is recognized as emergent and the creation message as liturgy and prophecy.

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