

# Genesis Reconsidered

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*The Bible and creation have been called the two books of revelation. The trend to disparage attempts at harmonization is mistaken, resulting from inadequate care in interpretation. Their primary aims are different, but interpretational crosschecks are meaningful. Taking Genesis 1-2 to reveal different modes of God's creating, and to constitute a continuous narrative, rather than two "creation stories", resolves some otherwise unsolved problems.*

The biblical texts were written by fallible humans, who were dependent on their own culture, with their language, a certain amount of knowledge and certain errors. But this does not automatically imply errors in their writings. The Bible claims to be inspired by God. He designed it for all cultures, but letting it be contaminated with gross errors would compromise it in some of them. Since the Creator is its ultimate author, interpreting a biblical text merely within the framework of ancient Near Eastern culture is inadequate. A biblical writer was guided to select, from his own vocabulary, words and phrases compatible with reality, even while perhaps holding some erroneous belief. But a myth masquerading as prophetic narrative revealing God's creation would be inconsistent with God's character of truth.<sup>1</sup> The Bible is not equivalent to any other book. It might contain information beyond the ken of its writers.

The "two books of God" provide complementary and concordant approaches to an indivisible reality. We may not always succeed in "reading" them without contradiction, as neither theologians nor scientists are infallible. But with sufficient care, we may approximate the facts. We start with the original data, i.e., the Hebrew text. Dictionaries and concordances clarify central concepts of Genesis, which are merged into an interpretation of the context as a unity.<sup>2</sup> Conflicts with scientific evidence must send theologians and scientists back to their studies, until a consensus is reached.<sup>3</sup>

## The meaning of creation

### Creation and development

A frequent misunderstanding, not supported by the text, consists of seeing God's work in Genesis 1 as primarily miraculous. The Hebrew verb *bara'* (to create<sup>4</sup>) designates exclusively divine creation of novelty. Three such creations are mentioned, the universe (1:1), animals (1:21), and humans (1:27), originating the physical, sentient, and spiritual realms. Between these events, developmental processes constituted the major part of what happened. Here, *ʿasah* (to make, also used of humans) is typically found, implying the further "preparation" or "development" of preexisting entities.<sup>5</sup> God saw that "all that he prepared" [*ʿasah*] was "very good", and finished "his work which he prepared".<sup>6</sup>

A second misunderstanding expects God's creating to have yielded the end product immediately. This reflects neither the meaning of *bara'*, nor the context. A good idea of its significance is conveyed by the fact that each individual is said to be created [*bara*].<sup>7</sup> Yet, upon conception this being is in no way finished: the seminal beginning is followed by a long development to the adult. There is no contradiction between having parents and being created by God. Genesis 1 makes it clear that after the origin of the universe "in the beginning", the creation was not finished, but had to pass through quite a development before achieving the desired state.

A third misunderstanding is the assumption that every creative act was detached from and independent of existing circumstances. Creative acts subsequent to the "beginning" had to occur into developmental processes already underway. This certainly was the case for the creation [*bara*] of the people of Israel, and other historical events called creations.<sup>8</sup> Each of them starts a development, but is itself logically and chronologically embedded in the course of history.

## Creation in development

A fourth misunderstanding opposes "supernatural" creation by God, which is not subject to scientific investigation, to "natural" events supposedly happening all by themselves and in principle explainable by science. All of creation is not only permanently held in existence by God, but also continuously the object of his activity. Whatever happens is either done by him, or, with acts of personal creatures, permitted by him. From the way he normally acts in the visible world<sup>9</sup> we formulate our natural laws. Thus, all we call "natural" has a "supernatural" foundation in the invisible world. Occasionally, as part of his special revelation, God performs special acts distinguished by their exceptionality. These "signs" attract attention precisely because his usual work consists of repeatable events, on which we may depend - so much so that their regularity is mistaken for necessity.

Furthermore, much of what happens in our "natural" world requires intelligent input to succeed. It begins with the "Anthropic Cosmological Principle", continues with the origin of life, and extends to much of what happened in the further history of life. Biology is brimful of structures of irreducible complexity, whose attribution to chance would be unreasonable.<sup>10</sup> The great mystery is not "natural selection of the fitter", but their origin. Atheists have a surprisingly huge faith in the gaps of our knowledge. God's invisible qualities can be recognized by pondering his handiwork.<sup>11</sup>

God has innumerable options of guiding natural events. They may be called "hidden options", because science is in principle unable to trace them.<sup>12</sup> Invoking chance just glosses over our ignorance. There is ample leeway in the known limits of scientific knowability. Quantum-indeterminate events or other contingencies, like the occurrence of a particular value out of a Gaussian distribution, pervade all natural processes. Atomic events can grow to global scopes, whenever nonlinearity is involved. One mutation may change the biosphere. Some of God's creating [*bara*], such as the composition of a genome at conception, and much of his developmental work [*asah*], such as originating life and many life functions, may involve such "hidden options".

Therefore, in addition to his normal activity in all of what happens, four types of creative acts of God can be distinguished: (1) the creation of new dimensions, as seen in the three uses of *bara*´ in Genesis 1; (2) the creation of individual "souls" and individual "spirits"; (3) the creation of novel, sometimes astronomically improbable configurations during evolution; (4) the performance of signs.

## Creation versus evolution?

Is creation or evolution true? Both: the Bible links them inseparably. At the end of the "creation story", the entire process is summarized: "These are the generations of the heavens and the earth in their being created".<sup>13</sup> The noun *toledoth* (generations) derives from the verb *holid* (to beget) and is a "technical term" for lines of descent and family trees.<sup>14</sup> Apparently, Genesis 1 is a register of descent, a genealogy, a phylogeny, containing words like seed, kinds, fruitful, multiply. Plant and animal groups appear sequentially in ascending order. As in other biblical genealogies known as "tables of nations", which enumerate various branches descending from a common ancestor, no individual procreative acts are mentioned, but some important events - like the appearance of the dry land - are worked into Genesis 1.

By linking descent, implying development over long periods, with the expression "in their being created" (*bara*´; "their" in Hebrew unambiguously refers to *toledoth*!), the text makes it clear that the evolution of life is closely interwoven with specific creative acts of God, which support it like pillars. Millennia before Darwin, the Bible resolved the controversy "creation or evolution" by means of the shortest possible formula, "These are the generations (descent, evolution) of the heavens and the earth in their being created [*bara*]. By "evolution", we just mean descent of all life from a common ancestor. Of course, we reject the atheistic world view of evolutionism.<sup>15</sup>

## Creation developing

### "In the beginning, God created the heavens and the earth" (Genesis 1:1)

God created the universe, called "the heavens and the earth", including time, space, energy.<sup>16</sup> Science models the history of the universe back to shortly after the Big Bang about 13.5 Ga (billion years) ago,<sup>17</sup> but is unable, in principle, to elucidate its cause.<sup>18</sup>

## "The earth was *tohuwabohu*, and darkness was over the deep" (Genesis 1:2)

Starting with verse 2, the existence of sun, moon and stars is taken for granted.<sup>19</sup> Now the scope narrows to the surface of the planet earth. Its description as *tohu wa-bohu* (formlessness and emptiness) will be discussed later. The entire earth was covered by water and darkness. As the sun already existed, the reason for the darkness appears to have been a cloud cover. The darkness was restricted to the earth, excluding "the heavens".

This description strikingly resembles the scientific picture of the early earth. It accreted 4.55 Ga ago, and the moon apparently formed by the impact of a Mars-sized body 4.5 Ga ago.<sup>20</sup> The earth was bombarded by planetesimals, differentiated into an iron core and a siliceous mantle in the molten state, and collected a secondary atmosphere and hydrosphere from volcanic outgassing and meteorite impacts. Sufficient cooling let a global ocean condense.<sup>21</sup> At a relatively high temperature, a thick cloud of water vapour enveloping the whole earth prevented the penetration of any light to the ocean surface.

## "The Spirit of God hovered over the surface of the waters" (Genesis 1:2)

The Hebrew *righeph*, translated "hover", occurs only once more in the Bible: "As an eagle stirs up its nest, hovering over its young, spreading its wings to catch them and bearing them on its pinions ..." God is pictured as protecting Israel in a hostile situation. The similarity to Genesis 1:2 extends to the use of *tohu* describing the environment: "He found them in a desert land, in a *tohu* ..." <sup>22</sup> As the Arabic and Syrian words cognate with *righeph* mean "protectively extend the wings", "lie down over ...", "brood", "hatch", it appears reasonable to assume that Genesis 1:2 indirectly points to early life. What else should God's Spirit have protected or brooded in the waters of the primitive earth, suitable for the beginning of the "*toledoth* of ... the earth"? God's Spirit always has to do with life. The phenomenological language of the Bible is not expected to mention microscopic life more specifically.<sup>23</sup>

Scientific evidence suggests that life appeared very soon after the earth's formation. Geochemical signatures believed to be specific for life have been dated at about 3.85 Ga.<sup>24</sup> Fossils of probable cyanobacteria, the first photosynthesizers, were found in rock 3.5 Ga old.<sup>25</sup> Scientists feel uneasy about the short time span left for the emergence of these "primitive" organisms, whose complexity eclipses modern technology. But even the age of the universe is by far insufficient for making plausible an *accidental* origin of the information required for life.<sup>26</sup>

## Day 1: "Let there be light!" (Genesis 1:3-5)

Further cooling and chemical change of the atmosphere later permitted the sun's light, still diffused by a permanent cloud cover,<sup>27</sup> to reach the surface, producing day and night. Does the statement that this was "day one" indicate 24-hour days?

### Days - ages

The Hebrew *yom* may be used for an earthly day, as well as for a period of unspecified length. "Days of God" are usually lengthy periods, like the day of God's rest, the day of salvation, the day of the Lord.<sup>28</sup> Creation days were certainly days of God, and the context establishes them as long epochs. Squeezing the rising of the continents and their colonization by plants into one day, or to expect marine animals multiplying naturally to fill the oceans within 24 hours, would do violence to the text! The explanation of the Sabbath command, "for in six days the Lord made heaven and earth", does not equate creation days with our work days. "Sabbath" is also used for a year and for a seven-year period. The human work week is but a shadow of the divine work. Biblical writers are emphatic about the impossibility of directly equating human and divine time scales.<sup>29</sup>

Scientifically, the general time frame of the history of the universe and of life is securely established.<sup>30</sup> Possible errors vary from less than 1 % for many radiometric dates to perhaps 10 % for the age of the universe. The fact that *none* of the radioactive isotopes having half lives below 500 ka (thousand years) is found on earth (apart from some formed continuously), while *all* of the ones with longer half lives do occur, is explainable only by their formation about 5-6 Ga ago. This gives us a solid clue for the order of magnitude involved – concordant with many independent dating methods. The short-day interpretation is therefore wrong.

It is quite legitimate to reconsider, in view of new findings, a long-standing traditional interpretation of biblical texts. The Bible itself presents some striking examples of such reinterpretations. Job's friends

were mistaken in their orthodoxy. Even Job himself had to "retract and repent in dust and ashes." The Pharisees, very serious Bible students, separated the prophecies about the suffering Servant of God from the Messiah. They were wrong, as could be seen in Jesus Christ. Even his own disciples had to be led to a fresh view of Bible passages they "knew" very well, when they found his tomb empty, and when he "explained to them in all the Scriptures what referred to himself." <sup>31</sup>

A day-age interpretation of Genesis 1 provides the possibility of correlating scientific data with the biblical text. Of course, the correctness of the concordant interpretation suggested does not automatically follow. <sup>32</sup> Interpretations need continual readjustment to relevant findings.

## **Day 2: Atmospheric expanse separating the waters (Genesis 1:6-8)**

The Hebrew *raqia*^, "expanse", often erroneously translated "firmament", specifies a thin, drawn-out layer, e.g. of plants on the earth's surface. Not solidity, but surface coverage and being thin is the basic idea, as evidenced by all cognate words. <sup>33</sup> Flying animals are said to move "on" the *raqia*^, <sup>34</sup> certainly not a solid dome. It is the relatively thin layer the lower atmosphere forms around the earth. The ancients knew the water cycle and would easily understand the *raqia*^ between the waters as the air space between oceans and clouds. <sup>35</sup> The two were separated when the atmosphere cleared, after its temperature fell below the dew point, generating the global water cycle. <sup>36</sup>

## **Day 3: Emergence of dry land (Genesis 1:9-10)**

Genesis describes the early earth as covered by water, and the dry land as emerging later - a fact one would suppose to have been unknown until recently! Mantle convection and associated tectonic activity caused land masses to rise out of a global ocean. Almost 4.0 Ga old continental remains have been found. <sup>37</sup> The oldest dated sediments derived from eroded land are 3.87 Ga old. <sup>38</sup>

### **Plants (Genesis 1:11-13)**

God told the land to produce plants. Did it have the capacity to do so? The verb *yatza*´ never designates creation, but the coming forth of preexisting things out of an environment given by the context. Just previously, the oceans were mentioned, over which God's Spirit had "brooded" earlier. They must have contained life which, after the emergence of the dry land, "came out". Continental weathering produced nutrients which drained into the oceans, "attracting" aquatic plants.

Diffuse light, penetrating the clouds since day 1, enabled cyanobacteria to produce oxygen by photosynthesis, as the plants did later. Oxidation led to geochemical changes and, almost 3 Ga later, to a substantial change in the atmosphere. Macroscopic marine algal fossils date from about 1.8 Ga ago. <sup>39</sup> The first terrestrial microfossils are 1.2 Ga old. <sup>40</sup> After 0.5 Ga ago, the atmospheric composition had stabilized sufficiently <sup>41</sup> to allow colonization of the dry land by plants about 475 Ma (million years) ago. <sup>42</sup>

### **The concept of "kind" (Genesis 1:11-12)**

The land made plants "according to their kinds [*min*]" come forth. *Min* has the primary meaning "split", "separation", "descent" and therefore emphasizes the derivation from a common origin and a permanent separation from it. In modern Hebrew, *min* designates sectarians, used for Jewish Christians, who derived from Jewish stock, but have, by their Christian conversion, deviated from Jewish doctrine and can no longer be received into their community of origin. "Kinds" [*min*] were neither created nor fixed, but originated through change and separation, becoming unable to merge again with their progenitor kinds. <sup>43</sup>

This parallels a biological species definition. Individuals belong to the same species if their union results in fertile descendents. Separation of populations, followed by divergent evolution, is believed to be a main cause of speciation. Different species have a common origin, but have become separate and incompatible.

## **Day 4: Lights in the sky (Genesis 1:14-17)**

On day 4, celestial bodies were not created, but became visible as "lights". Their origin goes back to the cosmological development initiated "in the beginning". Here, the earth is in focus; "sun" or "moon" are not named.

Previously, light of celestial bodies had reached the earth's surface only in scattered form, such as on an overcast day. The text does not say that bodies were "affixed to the firmament", but that God "gave" the lights (the light rays, *not* their sources) "into the *raqia*^ of the skies", the region which previously could not be reached by direct light. Now changed atmospheric conditions caused the previously permanent cloud cover to break open, so that for the first time the celestial bodies appeared as "lights in the sky". Over some time, the lights were being "prepared" [*^asah*], coming through hazily first, more clearly later. Literally, God said "Let it be (singular): lights (plural)!" The single process of the atmospheric change caused the appearance of a multitude of lights. They were to provide space and time indications required by many organisms.

### Day 5: Creation of "living souls" (Genesis 1:20-23)

In the waters of the oceans, the second act of creation produced "living souls" [*nephesh ghayah*]. This designation apparently implies sensation, instincts, and deliberately controlled movements. The soul represents a fundamentally novel dimension, the psychological domain. According to biblical understanding, such animals are the first genuinely living beings; plants are never called "living". Noah and Israel were forbidden to eat blood, because "the soul is in the blood", which is "given for atonement".<sup>44</sup> Apparently, only what we loosely call "higher" animals, with a blood circulation and with a brain serving more than minimal sensory functions, are "living souls", unlike most invertebrates. Although some sensory functions directing movements are found in all lower organisms, the integrated set of sentient capacities characterizing "living souls" originated perhaps with rapidly swimming cartilaginous fish, about 385 Ma ago.<sup>45</sup>

The creatures of day 5 are described as "great monsters", "living souls, the creeping ones [*remes*] which swarm [*sharatz*]", and "winged flyers". *Sharatz* is sometimes translated "creep", "bring forth abundantly", "teem", *remes* also "moving". These terms specifically qualify the expression "living souls", so they may hint at the existence of earlier "creepers which swarmed" to a certain degree, but were not "living souls". The mention of flying creatures as early animals, reproducing on the dry land, is interesting. The Hebrew noun *^oph* is derived from *^ooph*, to fly, and designates any flying animal.<sup>46</sup> Although birds appeared much later, insects arose about 385 Ma, winged ones 330 Ma ago.<sup>47</sup>

The creation of "living souls" did not imply the creation of their bodies, but represented a new dimension bestowed on them. Previously evolved animals were now "ensouled". Similarly, the "natural" procreative origin of individual animals of preexisting species is described as God "creating" them [*bara*].<sup>48</sup> Apparently, the creative act of day 5 concerned the psychological domain, which transcends the physical features like brain, circulation, hormones used by it. These genetically determined aspects would be the product of evolution, but consciousness of each *individual* "living soul" is created. Thus, the first "living souls" exemplify two of the four modes of God's creating mentioned earlier: *generic* and *individual* non-evolutionary novelty.

### Day 6: "Let the land produce living souls!" (Genesis 1:24-25)

The land, now sufficiently prepared, "caused" already existing animals "to come out" [*yatza*] onto the dry land. They would have come from the oceans, which immediately beforehand were said to be "teeming" with "living souls". No new dimension is created, nor is a blessing mentioned. As a tree of descent suggests, the terrestrial animals descended from aquatic ones, inheriting their psychosomatic capacities. They were then purposefully "prepared" [*^asah*] by God.

## Chronology

Does the fossil record agree with the sequence of events in Genesis? Some atmospheric oxygen, first produced by cyanobacteria (3.5 Ga, day 2) and marine algae (1.8 Ga), was required for the emergence of macroscopically visible animals (565 Ma).<sup>49</sup> It is believed that the spectacular "Cambrian explosion" (530 Ma), producing representatives of all animal phyla, was occasioned by a further surge in oxygen, itself caused by the sedimentary burial of large amounts of carbon of earlier organisms. Yet all these lower animals are not explicitly mentioned in Genesis, not being "living souls". Later, plants colonized the dry land (475 Ma, day 3), providing more oxygen, which was needed for larger, active animals called "living souls" (385 Ma, day 5), winged insects (330 Ma, day 5), terrestrial animals (335 Ma, day 6).<sup>50</sup> Animals had long been restricted to the water, until land plants had produced sufficient oxygen, an ozone shield, and a basis for the terrestrial food web.

The time of the first breaking of the cloud cover (day 4) is not yet known. The first known flying creatures (day 5) and the first known terrestrial animals (day 6) have about the same age. Even correctly dated fossils can only give the latest possible date of emergence of a group, as earlier representatives may still be found. Flying insects are much less likely to get fossilized than amphibians, yielding a late bias for their first fossils.<sup>51</sup> With this possible problem, the sequence of appearance is the same in Genesis 1, in the fossil record, and by bio-geochemical logic.

### **"Let us make man! ... Then God created man" (Genesis 1:26-27)**

Anthropogenesis proceeded in two steps. God declared that he was going to prepare [*ʿasah*] humans, then he created [*bara*] them. Apparently God prepared humans by an evolutionary process (tree of descent, Genesis 2:4) out of animals.<sup>52</sup> A preexisting entity required some additional preparation [*ʿasah*] to become what it was intended to be.<sup>53</sup> The human body is constituted like animal bodies, and the sentient domain is a refinement of capacities given to other "living souls".

Then God "created man in his image" by creating, in preexisting hominids, the spiritual dimension, which, being of the invisible world, could not emerge from the visible one. Mankind has aspects of both worlds, just as each child is also God's creation. The "image of God", or personhood, implies language, free will, responsibility, abstract thinking, logic, creativity, deliberate planning, design of tools, dominion over other creatures, and, most important of all, the ability to enter into a personal faith relationship with God. Humans were told to fill the earth, and "it was so" within day 6, which therefore must contain a long human history.

This twofold origin of humans - descended from animals and created in the image of God - is the basis for their special status as representatives between God and the earthly creation. Their mandate of lordship over the creation presupposes an attitude of stewardship given by the "image of God".

The fossil record shows *Australopithecines*, which were more human-like than chimpanzees.<sup>54</sup> It is uncertain where *Homo habilis*, at 2 Ma, belongs.<sup>55</sup> *H. erectus* dates from almost 2 Ma to possibly 50 ka ago,<sup>56</sup> *H. sapiens* from perhaps 500 ka to today. Coarse stone tools from Ethiopia have been dated at 2.5 Ma.<sup>57</sup> *H. erectus* fossils from Africa and Indonesia are 1.8 Ma old,<sup>58</sup> archaic *H. sapiens* fossils from England 500 ka.<sup>59</sup> Fire may have been intentionally used 500 ka ago.<sup>60</sup> "Modern" humans lived in Israel and Africa 100 ka ago.<sup>61</sup> All living humans apparently descend from them.<sup>62</sup> Carved objects and human burials with flowers from Europe and the Middle East have been dated at 60 ka. Cave bear skulls were possibly presented as offerings in a Swiss cave approximately 50 ka ago.<sup>63</sup> Human fossils from Australia and sophisticated stone tools from Europe are 40 ka old, exquisite cave paintings and carved figurines in Europe 30 ka,<sup>64</sup> human fossils from both Americas 12 ka.<sup>65</sup> Agriculture dates from 11 ka<sup>66</sup> and bronze use from 5 ka ago,<sup>67</sup> both in the Middle East.

*H. erectus* and archaic *H. sapiens* look quite human. If they are not biblically human, they must be precursors of our species, if God's "book of nature" is not to be charged with deception. That the industry remained rather crude for 2 Ma puzzles scientists. Sophisticated tools, art, and possible indications of a spiritual consciousness appeared after 100 ka ago. Our conclusion that the creation of humans in God's image occurred then is tentative, as any evidence for spirituality is scientifically ambiguous.<sup>68</sup>

## **Life and death manifest**

### **Day 7: Calling of Adam (Genesis 2:5-25)**

"These are the generations  
of the heavens  
and the earth  
in their being created  
in the day  
of preparing God Yahweh  
earth  
and heavens". (Genesis 2:4)

This concludes and summarizes 1:1-2:3. As it uses "Yahweh", those who call Genesis 2:5-25 a second "creation story" join 2:4 (or its second half) to what follows, separating it from what goes before. But the deliberately symmetrical construct of 2:4 cannot be reasonably cut in the middle. Its contents,

"generations" , "the heavens and the earth", and "created", refer to Genesis 1, *not* 2:5-25, the "forming" of Adam and the restricted "land" of the garden of Eden. Yet the name Yahweh opens up the personal-level relationship dealt with in Genesis 2:5-25. Therefore, Genesis 2:4 links the two chapters into one continuous narrative. The creation of man (day 6) and the forming of Adam (day 7) were different events! In day 7, God "ceased" from his work of preparing a habitable earth.<sup>69</sup> He blessed this day, consecrating it for the purpose of realizing his fellowship with man. Day 7 continues today, and believers are to enter into this "rest" of God,<sup>70</sup> recalling Adam's initial state.

In Genesis 2:7, God did not create man, but "formed" Adam. *Yatzar* means to form, design and commit, plan and realize.<sup>71</sup> When used of God, it may be a "technical term" for formation in one's mother's womb, suggesting that Adam had parents.<sup>72</sup> God "committing" to realization his specific "design" does not exclude Adam's descent from earlier humans. He was formed of *ʿafar*, used of any kind of unstructured matter,<sup>73</sup> referring either to the physical matter at the origin of life 4 Ga ago, or to the chemicals forming the basis of his own body. In any case, his whole preparation was God's work. Agriculture and bronze use in Genesis 4 may date Adam's immediate descendents about 6 ka ago.

Thus, we postulate that Adam was not the first genuine human, but that he belonged to the human species already 100,000 years old. In spiritual terms, he was the typical representative of the old (fallen) human species, both before and after his time, just as Christ is the risen "firstfruits" of the new humanity of those "born of the Spirit", both before and after his time on earth.<sup>74</sup>

There is an obvious contrast between (a) Genesis 1:26ff and (b) 2:7ff. In (a), God is called *ʿelohim*, representing his general relationship to the creation; in (b), *Yahweh ʿelohim*. *Yahweh*, freely translated "I am",<sup>75</sup> is his name used in the context of his covenants with humans, implying a personal relationship. While (a) deals with "man" [*ʿadam*] in a collective sense, or humankind, (b) deals with "the man" named Adam. In (a), God *created* "them", collectively; in (b), he *designed* "him" individually. In (a), humans are declared to be created "male and female", two collective terms; in (b), the Lord deals with "Adam and his wife", an individual couple. Consistently, (a) uses general, collective language; but (b) uses specific, personal terms. These and other features are explainable if (a) and (b) deal with different epochs, whereas making them versions of the same story creates problems.

Each human being is individually created [*bara* ], designed [*yatzar*], and prepared [*ʿasah*] by God.<sup>76</sup> Particular genetic complements, derived from molecular contingencies of extremely low probability, as well as individual psychological and spiritual constitutions, are presumably selected by God. Adam had a dual nature, a close relationship to the animals, and the *neshamah*, breath or "spirit of understanding", which God "breathed into his nostrils". It differs from *rooagh*, the usual word for spirit.<sup>77</sup> Every human being is "spirit", capable of entering into communion with God. However, this fellowship is not realized automatically, but requires a conscious conversion and a "new birth" - or its equivalent in the appropriate divine economy. Did Adam, in the *neshamah*, receive this "new life"?<sup>78</sup>

What distinguishes Adam from earlier humans? We believe he was called to deal with the problem of evil, death and corruption in creation, to open for humanity the way into spiritual communion with God.<sup>79</sup> Adam is called "the first man", Jesus "the second man" (both *not* in a biological sense!); only Adam (before the fall) and Jesus had the undisturbed communion with God intended for humans. The biblical genealogies cover the time from "the beginning" to Jesus Christ, the "last Adam", who became a "life-giving Spirit", originating a new, spiritual humanity.<sup>80</sup>

## Is evolution unfit for creation?

Evolution is supposedly "red in tooth and claw", death being its tool. Equating evolution with this evolutionism is unrealistic. Natural selection occurs by differential reproduction, due to different stress incidence, sensitivity of reproduction to stress, numbers of progeny attainable, and survival before reproduction ends. Only the latter factor has to do with death at all. Some kinds of biological "death" are unavoidable and theologically unobjectionable. Microorganisms are required as symbionts and food additives, and within a few billion years a habitable environment was prepared from their activity and substance.<sup>81</sup> Plants are needed for food. Programmed resorption of cells is required in developmental and maintenance processes in animals.<sup>82</sup>

The biosphere does contain violent death, but this is a feature of ecology, not evolution as such. Since what God had done in the creation was declared "very good", some conclude that before Adam's fall there could not have been death, which would be an unworthy "means of creation".<sup>83</sup> This claim has unacceptable implications. By ignoring an enormous amount of observational support for the length of

the history of life,<sup>84</sup> it compromises God's veracity, because reliability of scientific observation is a prerequisite for obeying his "cultural mandate". A biosphere without population steady states cannot last. Insinuating that pre-human ecology was bound to terminate shortly makes God responsible for Adam's sin. Also, a biosphere without death and suffering due to carnivory, disease and parasites would imply radically different food webs, metabolism, and reproduction. God alone would be capable of realizing such an instant new creation after the fall, restructuring all species, making him the author of death. Both scientifically and theologically, this is preposterous. There is no hint for it in the Bible.

## Death's real background

Natural agents damage genomes, limiting animals' life spans, implying death. Most marine and many terrestrial species are carnivores. Humans were given animals for food, being told to "rule over the fish",<sup>85</sup> which cannot be used alive. God's warning to Adam implied that he knew what death is. Why did the "living souls" created by God have to die?

Adam was to guard [*shamar*] the paradise, designating some danger, and the "tree of knowledge of good and evil" implied that evil existed. It was Satan's fall that corrupted creation, resulting in the *tohu wa-bohu* of Genesis 1:2, natural evil, and death and suffering of "living souls". In the Bible, *tohu* is invariably negative: formlessness, waste, vanity by turning to idols; *bohu*, emptiness, always occurs together with *tohu*, in situations of destruction. God did not cause suffering and death, but mercifully he continued on this new basis, incorporating even these to the best end.<sup>86</sup> After Satan's fall, God's preparing the creation and Satan's corrupting it (under God's permission) proceeded concomitantly.<sup>87</sup> From now on, what God did was explicitly declared "good". When, with the creation of humanity, a "very good" state was reached, "the heavens and the earth and all their host" were completed. Hosts [*tzava*] usually denote armies. Was the creation now ready for the final battle rescuing it from corruption?

Humans before Adam were mortal like other "living souls". Now Adam and Eve were called out to immediate community with God, in order to set up his kingdom, with the "tree of life" presaging eternal life to be manifested. But with their sin, they fell. Unlike animals and earlier humans, they willfully chose the realm of death. God's plan for his creation appeared doomed again. The fall translated into immediate spiritual death, while physical death was deferred, providing an opportunity of repentance and restoration.<sup>88</sup> In the death of sacrificial animals, Adam and Eve received a symbol of redemption, and God promised that the woman's offspring would crush Satan's head. The drama was initiated which led to the propitiatory death of God's Son on the cross, where death was "swallowed up in victory".<sup>89</sup>

## Mythologizing the Bible

Some interpreters exclude inspiration, and thus the possibility of a harmony like the one suggested. Perceiving the text to conflict with scientific evidence, or with their own world view, they disregard it as a source of useful information for all but a fuzzy "religious" background.

Divine revelation is one possible source of a prescientific creation story, and Genesis 1 presents itself as prophetic narrative.<sup>90</sup> Babylonian myths like Enuma Elish contain some formulations resembling biblical ones. These myths are said to be a source of Genesis 1, which is made a derived myth and dated at 500 BC. Claiming to demythologize the Bible, such interpreters in fact mythologize it. But unlike myths, Genesis yields an interpretation compatible with scientific observation. Not only is its theological background of incomparably higher quality than that of myths, but also the content of its narrative. Thus, Genesis must be a source of some formulations in Enuma Elish, not vice versa. As Abraham's ancestors lived in Chaldea, the real source of Genesis 1 may have been known there in 2000 BC. It is not a conflicting later version of the creation story of Genesis 2, but the latter is a logical sequel of Genesis 1.

The reversal of perceived influence goes hand in hand with an uncritical acceptance of evolutionism. Within a mere 100 ka, only some microevolution of humanity could have occurred, with negligible effect on history. History must be understood within the framework of free will and responsibility. The application of evolutionary ideas to spiritual reality is even less reasonable, especially if revelation occurred. Theologians invented "evolution" from animistic religion to monotheism within a few centuries! In this vein, the "historical critical method" rewrote a large part of Israel's history presented in the Bible. It claims plenty of manipulation by unthinking redactors, producing innumerable contradictions, mostly based on circular reasoning.<sup>91</sup>



As part of this process of mythologizing the Bible, the myth of the "three-stories universe" as the worldview before the Enlightenment was forged, with the celestial bodies fixed to a solid firmament above a flat earth, and hell underneath. Yet the sphericity of the earth was known at least since Pythagoras in the sixth century BC, and not much later all educated persons in the ancient world and throughout medieval times accepted it. Sun, moon and planets can be seen to move with respect to the other stars, which circle the earth. The spherical shape of the earth is also indicated by the fact that with decreasing distance, a mountain seems to rise higher and higher above the sea or a plain. In the third century BC, Eratosthenes estimated the earth's diameter from the relationship between geographical latitude and solar elevation. The lie of the belief in a flat earth was perpetrated around 1830 by Letronne and Irving as a derision of creation.<sup>92</sup>

The contrasts between Genesis 1 and 2 were attributed to different sources. Radical criticism widely destroyed confidence in biblical reliability. But an unprejudiced reading of the text resolves the imagined contradictions and avoids making myths out of texts which do not present parables but prophetic narrative.

## Notes

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\* ASA Fellow. To whom correspondence should be addressed. This paper includes ideas from "Mechanisms of Creation in Biology", a presentation by P.R. at the ASA Annual Meeting 1997, Santa Barbara, CA, and analyses of the Biblical Hebrew texts by A.H., cf. note 5.

<sup>1</sup> 2 Timothy 3:16; 2 Peter 1:16.

<sup>2</sup> We consider the immediate and wider contexts, up to the entire Bible, including the New Testament.

<sup>3</sup> We realize that our interpretations are not in line with the customary ones, but we want to present them for discussion, as we consider them, on the whole, to be more satisfactory, or, at least, to aid meaningful interpretation in a significant way. Also, we think that historical and allegorical interpretations need not necessarily exclude each other, as they may both result from the Creator's design (cf. Galatians 4:21-31).

<sup>4</sup> *The Englishman's Hebrew and Chaldee Concordance of the Old Testament* (Samuel Bagster & Sons, London, 5th ed. 1890), 270. *Bara'*, translated "to clear (forest)", is used of men in Joshua 17:15.18; 1 Samuel 2:29; Ezekiel 23:47; 21:19 (24). *The NIV™ Interlinear Hebrew-English Old Testament*, ed. J.R. Kohlenberger III (Zondervan, Grand Rapids, MI, 1987).

<sup>5</sup> Claeys, K. & Held, A. (1985), *Die Evolution aus biblisch-theologischer Sicht* (unpublished manuscript), 44-67; Claeys, K. (1998), *R-Evolution in der Genesis* (manuscript by K.Claeys, deceased 1986, to be published, ed. Held, A. & Claeys, G.).

<sup>6</sup> Genesis 1:31; 2:2.

<sup>7</sup> Isaiah 43:7, cf. Job 10:8-12,18; Psalm 102:18; 104:30; 139:13-18; Malachi 2:10.

<sup>8</sup> Isaiah 43:15; 41:10.

<sup>9</sup> The Bible talks of two fundamentally different dimensions, the "invisible" and the "visible": Colossians 1:16; John 3:31; 2 Corinthians 4:18; 1 Corinthians 2:14-15; 1 Corinthians 15:40; Romans 8:5; 1 Corinthians 3:1; John 3:7-8.

<sup>10</sup> Rüst, P. (1984), "Spezielle und allgemeine Evolutionstheorie: Fakten und Spekulation", in: *Zur Diskussion um Schöpfung und Evolution*, eds. Gutsche, E., Hägele, P.C. & Hafner, H. (Symon & Wagner, Marburg, Germany), 59-115; Rüst, P. (1988), "The unbelievable belief that almost any DNA sequence will specify life", unpublished paper presented at the Conference on *Sources of Information Content in DNA* in Tacoma, WA; Rüst, P. (1992), "How Has Life and Its Diversity Been Produced?" *Persp.Sci.Christ.Faith* **44**, 80-94; Behe, M.J. (1996), *Darwin's Black Box* (The Free Press, New York); Dembski, W.A. (1997), "Intelligent Design as a Theory of Information", *Persp.Sci.Christ.Faith* **49**, 180-190; Rüst, P. (1998), updated version of (1984), in 4th ed. (Studentenmission in Deutschland, Marburg, Germany), 51-112.

<sup>11</sup> Romans 1:20.

<sup>12</sup> For a similar idea cf. Polkinghorne, J. (1994), *Quarks, Chaos, and Christianity*, (Triangle, London, England).

<sup>13</sup> Genesis 2:4; Claeys, K. (1998), note 5.

<sup>14</sup> All occurrences: Genesis 2:4; 5:1; 6:9; 10:1,32 (this is an example of a "table of nations"); 11:10,27; 25:12,13,19; 36:1,9; 37:2; Exodus 6:16,19; 28:10; Numbers 1:20,22,24,26,28,30,32,34,36,38,40,42; 3:1; Ruth 4:18; 1 Chronicles 1:29; 5,7; 7:2,4,9; 8:28; 9:9,34; 26:31.

<sup>15</sup> Wiester, J.L. (1993), "The Real Meaning of Evolution", *Persp.Sci.Christ.Faith* **45**, 182-186.

- <sup>16</sup> We are not claiming Genesis 1 to "teach modern cosmology", but we want to show that a very good case can be made for non-contradiction between the biblical narrative and scientific data. The opinions that Genesis 1 reflects an ancient mythological world view, and that this view implied a flat earth and a solid firmament are popular. We consider both of these opinions to be in error. Seely, P.H. (1991), "The Firmament and the Water Above; Part I: The Meaning of *raqia'* in Gen 1:6-8", *Westminster Theol.J.* **53**, 227-240; Seely, P.H. (1992), "The Firmament and the Water Above; Part II: The Meaning of 'The Water above the Firmament' in Gen 1:6-8", *Westminster Theol.J.* **54**, 31-46; Seely, P.H. (1997), "The Geographical Meaning of 'Earth' and 'Seas' in Gen 1:10", *Westminster Theol.J.* **59**, 231-255. Seely interprets Hebrew concepts on purely external ethnological grounds, concluding from non-Hebrew "primitive" views that the correct interpretation of Genesis 1 must be a flat-earth mythological one. He assumes without discussion that even divine inspiration would make do with however erroneous the world view of a prophet's cultural background might happen to be. On the other hand, Russell, J.B. (1997), *Inventing the Flat Earth: Columbus and Modern Historians* (Praeger, Westport, CT) demonstrates the recent origin of the "three-story-universe" myth. We further consider this question in the last section of our paper.
- <sup>17</sup> Huchra, J.P. (1996), "Determining the age of the universe", *Endeavour* **20**, 139; Spergel, D.N. *et al.* (1997), "The age of the Universe", *Proc.Natl.Acad.Sci.USA* **94**, 6579-6584; Watson, A. (1998), "The Universe Shows Its Age", *Science* **279**, 981-983; Cohen, J.G., Blakeslee, J.P. & Ryshev, A. (1998), "The Ages and Abundances of a Large Sample of M87 Globular Clusters", *Astrophys.J.* **496**, 808-826; Krauss, L.M. (1998), "The End of the Age Problem, and the Case for a Cosmological Constant Revisited", *Astrophys.J.* **501**, 461-466.
- <sup>18</sup> Smolin, L. (1992), "Did the universe evolve?" *Class.Quantum Grav.* **9**, 173-191; Maynard Smith, J. & Szathmáry, E. (1996), "On the likelihood of habitable worlds", *Nature* **384**, 107; Rüst, P., Brugger, H.R. & Ross, H. (1997), "On the unlikelihood of habitable worlds", unpublished.
- <sup>19</sup> This is implied in what we believe to be the most sensible interpretations in the entire context of Genesis 1-2, as shown in our subsequent exposition. We do not take Genesis 1:1 to represent a title, but the beginning of what happened. After this "beginning", "the heavens and the earth" existed. It would be odd if here, "the heavens and the earth" would not include sun, moon, and stars, while it would in all other places. Furthermore, verse 2 specifically localizes the darkness to the surface of the earth's ocean, implying light (and light sources) elsewhere.
- <sup>20</sup> Ida, S. *et al.* (1997), "Lunar accretion from an impact-generated disk", *Nature* **389**, 353-357; Lee, D.C. *et al.* (1997), "Age and Origin of the Moon", *Science* **278**, 1098-1103.
- <sup>21</sup> Gaffey, M.J. (1997), "The Early Solar System", *Orig.Life Evol.Biosph.* **27**, 185-203; Whittet, D.C.B. (1997), "Is extraterrestrial organic matter relevant to the origin of life on Earth?" *Orig.Life Evol.Biosph.* **27**, 249-262.
- <sup>22</sup> Deuteronomy 32:10-11. An interesting parallel to the Hebrew *righeph* is found in the Greek *θαλπω*, to cherish, to keep warm, found in Ephesians 5:29 and 1 Thessalonians 2:7 for Christ cherishing his Church, a husband cherishing his wife, a man protecting his natural life, an apostle caring for his spiritual children, and a nurse taking care of the children she has been entrusted with. Originally, *θαλπω* was used for birds' brooding, cf. Rienecker, F. (1952), *Sprachlicher Schlüssel zum Griechischen Neuen Testament* (Brunnen-Verlag, Giessen, Germany), 454.
- <sup>23</sup> Ross, H. (1979), *Genesis One: A Scientific Perspective* (Reasons to Believe, Pasadena, CA), 10. Today, the only origin-of-life theory based on a somewhat plausible chemistry assumes a hot, dark environment in suboceanic conduits: Wächtershäuser, G. (1992), "Groundworks for an Evolutionary Biochemistry: The Iron-Sulphur World", *Prog.Biophys.Molec.Biol.* **58**, 85-201; Wächtershäuser, G. (1994), "Life in a ligand sphere", *Proc.Natl.Acad.Sci. USA* **91**, 4283-4287; criticized by Österberg, R. (1997), "On the prebiotic role of iron and sulfur", *Orig.Life Evol.Biosph.* **27**, 181-184.
- <sup>24</sup> Wilson, E. (1996), "Earth had life earlier than previously thought", *Chem.& Eng.News* (Nov.11), 10; Holland, H.D. (1997), "Evidence for Life on Earth More Than 3850 Million Years Ago", *Science* **275**, 38-39.
- <sup>25</sup> Edwards, D. (1993), "Monera (Bacteria, Blue-green algae)", in: *The Fossil Record 2*, ed. Benton, M.J. (Chapman & Hall, London), 3-7; Kump, L. (1993), "Bacteria forge a new link", *Nature* **362**, 790-791; Mooers, A.Ø. & Redfield, R.J. (1996), "Digging up the roots of life", *Nature* **379**, 587-588. Grotzinger, J.P. & Rothman, D.H. (1996), "An abiotic model for stromatolite morphogenesis", *Nature* **383**, 423-425 dispute a cyanobacterial interpretation.
- <sup>26</sup> Rüst, P. (1984; 1988; 1998), note 10; Thaxton, C.B., Bradley, W.L. & Olsen, R.L. (1984), *The Mystery of Life's Origin* (Philosophical Library, New York); Cohen, J. (1995), "Novel Center Seeks to Add Spark to Origins of Life", *Science* **270**, 1925-1926; Balter, M. (1996), "Looking for Clues to the Mystery of Life on Earth", *Science* **273**, 870-872; Lifson, S. (1997), "On the Crucial Stages in the Origin of Animate Matter", *J.Molec.Evol.* **44**, 1-8. De Duve, C. (1995), *Vital Dust* (Basic Books, New York), 9, believes, on the basis of circular reasoning, the probability of a spontaneous origin of life to be high; De Duve, C. (1995), "The Beginnings of Life on Earth", *Amer.Scientist* **83**, 428-437.

- <sup>27</sup> Kasting, J.F. (1993), "Earth's Early Atmosphere", *Science* **259**, 920-926; Rye, R. *et al.* (1995), "Atmospheric carbon dioxide concentrations before 2.2 billion years ago", *Nature* **378**, 603-605; Davis, W.L. & McKay, C.P. (1996), "Origins of Life, a Comparison of Theories and Application to Mars", *Orig.Life Evol.Biosph.* **26**, 61-73; Saga, C. & Chyba, C. (1997), "The Early Faint Sun Paradox: Organic Shielding of Ultraviolet-Labile Greenhouse Gases", *Science* **276**, 1217-1221; Forget, F. & Pierrehumbert, R.T. (1997), "Warming Early Mars with Carbon Dioxide Clouds That Scatter Infrared Radiation", *Science* **278**, 1273-1276.
- <sup>28</sup> In Genesis 2:4, the singular *yom* stands for all of the "beginning" and the six "days" of Genesis 1. Thus, it cannot be a single day. In Isaiah 23:15, "that day" comprises 70 years. In the "day" of Ezekiel 36:33, cities will be inhabited and waste places rebuilt. For explicitly long "days" cf. further Ecclesiastes 12:3; Psalm 90:4; 2 Peter 3:8; Hebrews 4:3-11; 2 Corinthians 6:2; 1 Corinthians 1:8; and Rienecker, F. (1991), *Lexikon zur Bibel* (Brockhaus, Wuppertal, Germany; 19. Aufl.), 1363-1364. The Scofield Bible (ed. Scofield, C.I., Oxford Univ.Press, New York, 1967, p. 1372) correctly identifies the "day of the Lord" with a lengthy period. In the prophets, there are many references to the "day of the Lord" which, in their context, make it plain that it must cover an extended period. The claim that *yom* must be restricted to a 24-hour day when used with a numeral (or, especially, an ordinal) cannot be substantiated, cf. Newman, R.C. & Eckelmann, H.J. (1989), *Genesis One and the Origin of the Earth* (Interdisciplinary Biblical Research Institute, Hatfield, PA; 3rd printing; ISBN 0-944788-97-1), 61-62. The same expression [*yom 'eghad*] which is used for "day one" in Genesis 1:5 is also found in Zechariah 14:7, where the context of chapters 12-14 shows that this "day of Yahweh" cannot be a normal 24-hour day. The idea that numerals would influence the length of the days conflicts with all normal language use.
- <sup>29</sup> Exodus 20:10-11; Leviticus 25:4,8; Matthew 6:30; 24:36-44; Acts 1:7; 2 Peter 3:8. The expression "there was evening [*ʿerev*] and there was morning [*boqer*]" does not justify 24-hour days, as the sequence would be wrong; a more precise translation, "a transition (mixing between two states) and a dawning (of a new age)", is compatible with ages.
- <sup>30</sup> Wonderly, D. (1977), *God's Time-Records in Ancient Sediments* (Crystal, Flint, MI); Brugger, H.R. (1982), "Die Geschichte der Schöpfung: Ist die Erde ein junger Planet?" *Reformatio* (Bern, Switzerland) **31**, 160-175; Young, D.A. (1982), *Christianity and the Age of the Earth* (Zondervan, Grand Rapids, MI); Wonderly, D.E. (1987), *Neglect of Geologic Data: Sedimentary Strata Compared With Young-Earth Creationist Writings* (IBRI, Hatfield, PA); Harland, W.B. *et al.* (1990), *A Geologic Timescale 1989* (Cambridge Univ.Press, Cambridge, England); Dalrymple, G.B. (1991), *The Age of the Earth* (Stanford Univ.Press, Stanford, CA); Ross, H. (1994), *Creation and Time*, (Navpress, Colorado Springs, CO). For the age of the universe cf. note 17.
- <sup>31</sup> Job 42:6; Luke 24:27. We are to study God's Word (Isaiah 34:16; Ezra 7:10; Psalm 119) and his works (Psalm 111:2; Ecclesiastes 1:13), and to judge tradition and teaching on the basis of external facts (Luke 7:19-22; Matthew 7:15-20; cf. 13:26) and Scripture (Acts 17:11).
- <sup>32</sup> Schroeder, G.L. (1997), *The Science of God* (The Free Press, New York) presents an alternative concordant interpretation. Taking the universe at the "beginning" (the time of the origin of matter, or quark confinement) as the relativistic reference frame, six days correspond to 16 billion earth years. Harmonization between modern scientific literature and the Bible is based on 13th century AD and earlier Jewish interpretations, in order to be free of modern prejudice.
- <sup>33</sup> The verb *raqaʿ*, "to spread out", from which the noun *raqiaʿ* is derived, designates covering a support with a thin layer of a substance whose nature is irrelevant. Of course, if a metal sheet is "spread out", this may be achieved by hammering, but in other cases, "hammering" or "making firm" cannot apply. Thus, a *raqiaʿ* may be a thin gold layer covering an idol (Isaiah 40:29), but also a layer of vegetation covering the land (Isaiah 42:5 uses *raqaʿ* for both the land and what comes out of it). The basic meaning of *raqiaʿ* is a thinly spread-out layer. Some cognate words in Hebrew are: *raq*: (1) thin, slight, (2) a little, only; *raqiq*: flat bread; *riqquʿim*: spread-out (metal sheets, cf. Numbers 16:38); in Assyrian: *rakaku*: to make thin; *rukku*: sheet, plate; in Arabic: *raqqa*: to be thin; *marquqa*: farmers' flat bread; *rakaʿh*: to spread out a stain; *rukʿh*: extension of an area; in Syrian: *riqoʿ*: to make thin.
- <sup>34</sup> In Genesis 1:20, the flying creatures, such as birds and insects, move "above" the land, "across" the face of the *raqiaʿ* of the heavens. As both "above" and "across" represent the same Hebrew *ʿal*, a similar meaning may be assumed. Translating "in front of" or "before" (in order to accord with a solid firmament) would certainly make no sense with respect to the land. As the flying creatures are supported by air, and "heavens" is used for the air space, outer space, or God's abode, flying "on" the air seems to be the most reasonable translation. See also: Claeys, K. (1979), *Die Bibel bestätigt das Weltbild der Naturwissenschaft* (Christiana-Verlag, Stein am Rhein, Switzerland; ISBN 3-7171-0745-3), 630-649.
- <sup>35</sup> Ecclesiastes 1:7 clearly describes the water cycle between sea and clouds, indicating that for ancient Hebrews it would have been most natural to take the "waters above the *raqiaʿ*" to be the clouds above the air space.
- <sup>36</sup> Ross, H. (1979), note 23, 7.

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- <sup>37</sup> Press, F. & Siever, R. (1981), *Earth* (Freeman, New York, NY); Bowring, S.A. & Housh, T. (1995), "The Earth's Early Evolution", *Science* **269**, 1535-1540.
- <sup>38</sup> Hayes, J.M. (1996), "The earliest memories of life on Earth", *Nature* **384**, 21-22; Wilson, E. (1996), note 24.
- <sup>39</sup> Edwards, D. *et al.* (1993), "Algae", in: *The Fossil Record 2*, note 25, 15-40.
- <sup>40</sup> Horodyski, R.J. & Knauth, L.P. (1994), "Life on Land in the Precambrian", *Science* **263**, 494-498.
- <sup>41</sup> Des Marais, D.J. *et al.* (1992), "Carbon isotope evidence for the stepwise oxidation of the Proterozoic environment", *Nature* **359**, 605-609; Logan, G.A. *et al.* (1995), "Terminal Proterozoic reorganization of biogeochemical cycles", *Nature* **376**, 53-56; Knoll, A.H. (1996), "Breathing room for early animals", *Nature* **382**, 111-112; Canfield, D.E. & Teske, A. (1996), "Late Proterozoic rise in atmospheric oxygen concentration inferred from phylogenetic and sulphur-isotope studies", *Nature* **382**, 127-132; Van Cappellen, P. & Ingall, E.D. (1996), "Redox Stabilization of the Atmosphere and Oceans by Phosphorus-Limited Marine Productivity", *Science* **271**, 493-496.
- <sup>42</sup> Edwards, D. (1993), "Bryophyta", in: *The Fossil Record 2*, note 25, 775-778; Kenrick, P. & Crane, P.R. (1997), "The origin and early evolution of plants on land", *Nature* **389**, 33-39.
- <sup>43</sup> Genesis 1:11,12,21,24,25. Claeys, K. & Held, A. (1985), note 5, 47-48. Seely, P.H. (1997), "The Meaning of Min, 'Kind'", *Sci.Christ.Belief* **9**, 47-56, interprets differently.
- <sup>44</sup> Genesis 9:4; Leviticus 17:11-14.
- <sup>45</sup> Carroll, R.L. (1988), *Vertebrate Paleontology and Evolution* (Freeman, New York), 16-61; Margulis, L. & Schwartz, K.V. (1988), *Five Kingdoms* (Freeman, New York); Cappetta, H. *et al.* (1993), "Chondrichthyes" , in: *The Fossil Record 2*, note 25, 593-609.
- <sup>46</sup> Deuteronomy 14:11-20.
- <sup>47</sup> Ross, A.J. & Jarzembowski, E.A. (1993), "Arthropoda (Hexopoda; Insecta)", in: *The Fossil Record 2*, note 25, 363-426.
- <sup>48</sup> Psalm 104:30.
- <sup>49</sup> Grotzinger, J.P. *et al.* (1995), "Biostratigraphic and Geochronologic Constraints on Early Animal Evolution", *Science* **270**, 598-604; Erwin, D. *et al.* (1997), "The Origin of Animal Body Plans", *Amer.Scientist* **85**, 126-137; Fortey, R.A. (1997), "The Cambrian evolutionary 'explosion' recalibrated", *BioEssays* **19**, 429-434.
- <sup>50</sup> Milner, A.R. (1993), "Amphibian-Grade Tetrapoda", in: *The Fossil Record 2*, note 25, 665-679; Moffat, A.S. (1997), "Teeth and Bones Tell Their Stories at Chicago Meeting", *Science* **278**, 801-802.
- <sup>51</sup> Of course, we leave the flying creatures in day 5, but expect that a solution to the relative dates of first appearance in the fossil record of flying creatures and of amphibians will be found, most likely through earlier "flyer" fossils, or possibly by a more precise ecology of the first amphibians (Milner, A.R. (1993), note 50, places the *Lethiscidae* and the first *Ophiderpetontidae* in the Visean Series, dated 349.5-332.9 Ma ago, and localizes them as "terrestrial/flowing-water"; the first clearly "terrestrial" animals were the *Caerorhachidae* and earliest *Dendrerpetonidae* in the Serpukhovian Series, dated 332.9-322.8 Ma ago).
- <sup>52</sup> Ecclesiastes 3:18-20 indicates that man is (biologically) an animal [*behemah*] like those of Genesis 1:24.
- <sup>53</sup> Claeys, K. (1979), note 34, 279, Claeys' note 27.
- <sup>54</sup> McHenry, H.M. (1994), "Tempo and mode in human evolution", *Proc.Natl.Acad.Sci.USA* **91**, 6780-6786; Wood, B. (1994), "The oldest hominid yet", *Nature* **371**, 280-281.
- <sup>55</sup> Wood, B. (1996), "Human evolution", *BioEssays* **18**, 945-954.
- <sup>56</sup> Gibbons, A. (1996), "A Rare Glimpse of an Early Human Face", *Science* **274**, 1298; Gibbons, A. (1996), "*Homo erectus* in Java: A 250,000-Year Anachronism", *Science* **274**, 1841-1842.
- <sup>57</sup> Semaw, S. (1997), "2.5-million-year-old stone tools from Gona, Ethiopia", *Nature* **385**, 333-336.
- <sup>58</sup> Gibbons, A. (1994), "Rewriting - and Redating - Prehistory", *Science* **263**, 1087-1088.
- <sup>59</sup> Roberts, M.B., Stringer, C.B. & Parfitt, S.A. (1994), "A hominid tibia from Middle Pleistocene sediments at Boxgrove, UK", *Nature* **369**, 311-313. A 1 Ma old fossil may show *H. sapiens* features: Abbate, E. *et al.* (1998), "A one-million-year-old *Homo* cranium from the Danakil (Afar) Depression of Eritrea", *Nature* **393**, 458-460.
- <sup>60</sup> Balter, M. (1995), "Did *Homo erectus* Tame Fire First?" *Science* **268**, 1570.

- <sup>61</sup> McDermott, F. *et al.* (1993), "Mass-spectrometric U-series dates for Israeli Neanderthal / early modern hominid sites", *Nature* **363**, 252-255; Waddle, D.M. (1994), "Matrix correlation tests support a single origin for modern humans", *Nature* **368**, 452-454.
- <sup>62</sup> Gibbons, A. (1997), "Y Chromosome Shows That Adam Was an African", *Science* **278**, 804-805.
- <sup>63</sup> Bächler, H. (1947), *Die ersten Bewohner der Schweiz* (Francke Verlag, Bern, Switzerland), 75-76, 141-154; Müller-Beck, H. (1968), "Das Altpaläolithikum", in: *Ur- und frühgeschichtliche Archäologie der Schweiz Vol.I* (Verlag Schweiz.Ges.Ur-u.Frühgesch., Basel, Switzerland), 89-106.
- <sup>64</sup> Hahn, J. (1970), "Der Schatz aus dem Hohlenstein", *Kosmos - Bild unserer Welt* **66**, 362-364; Fischman, J. (1995), "Painted Puzzles Line the Walls of an Ancient Cave", *Science* **267**, 614; Bjerklie, D. *et al.* (1995), "Behold the Stone Age", *Time* (Feb.13), 34-44; Balter, M. (1996), "Cave Structure Boosts Neandertal Image", *Science* **271**, 449.
- <sup>65</sup> Amato, I. (1993), "American Family Tree Gets New Root", *Science* **260**, 22.
- <sup>66</sup> Cavalli-Sforza, L.L. *et al.* (1993), "Demic Expansions and Human Evolution", *Science* **259**, 639-646; Diamond, J. (1997), "Location, Location, Location: The First Farmers", *Science* **278**, 1243-1244.
- <sup>67</sup> Kenyon, K.M. (1978), *The Bible and Recent Archaeology* (Brit.Museum Publ., London, England).
- <sup>68</sup> Morton, G.R. (1997), "The Mediterranean Flood", *Persp.Sci.Christ.Faith* **49**, 238-251, equates Noah's flood with the catastrophic refilling of the mediterranean basin 5.5 million years ago, cf. Hsü, K. (1983), *The Mediterranean Was a Desert* (Princeton Univ.Press, Princeton, NJ). This would require biblical humanity to begin with hominids having brain sizes hardly larger than those of chimpanzees, as well as over 5 million years of "human" history without any culture. Another catastrophic flood occurred about 7,500 years ago near the Ararat region, cf. Kerr, R.A. (1998), "Black Sea Deluge May Have Helped Spread Farming", *Science* **279**, 1132.
- <sup>69</sup> This includes his three acts of creation of generic non-evolutionary novelty marked by the use of *bara´* in Genesis 1. Of course, the other three modes of God's creating, discussed in the section on the meaning of creation, did not cease.
- <sup>70</sup> Genesis 2:2; Hebrews 4:3-11. Hebrew *shabath* means to cease, to end, to bring to rest. God doesn't need rest; he continued to work on the Sabbath (Isaiah 40:28; John 5:17). The purpose of the Sabbath is communion with God, not inactivity. Unlike the six days of Genesis 1, the seventh day is nowhere said to have ended.
- <sup>71</sup> Claeys, K. (1979), note 34, 513-556: Hebrew *yatzar* = German "entwerfend festlegen" (to commit by designing).
- <sup>72</sup> Literally, Genesis 2:7 reads: "And God Yahweh formed [*yatzar*] the Adam, dust [*ʿafar*] from the ground [*ʿadamah*]", i.e., the Adam who was dust, derived from the ground. God did not form him *out* of dust. In Genesis 3:19, God tells him: "dust [*ʿafar*] you *are* [present tense!], and to dust [*ʿafar*] you will return". The same thing is said in Ecclesiastes 3:20 of *all* humans and animals. Psalm 103:14 reads: "He knows our frame [or formation, *yetzer*, derived from *yatzar*], he remembers that we *are* [present tense!] dust [*ʿafar*]", Isaiah 64:8 says: "We are the clay [not *ʿafar*] and you are our potter [participle of *yatzar*], we are all the work of your hand". And Job agrees: "I too was taken from clay" (33:6). He pleads with God: "Your hands shaped me and made me ... Remember that you molded me like clay. Will you now turn me to dust [*ʿafar*] again?" (Job 10:8-9). But he also specifies: "Did not he who made me in the womb make them? Did not the same one form [not *yatzar*] us both within the womb?" (Job 31:15). Similarly, Jeremiah (1:5) was formed [*yatzar*] in the womb by God. Thus, "to be formed out of dust" by God, or "formed out of clay" (as a potter does) was a customary metaphor for growing in one's mother's womb. The formation of Adam's body is couched in the same terms. Whatever constitutes the bodies of each human being is ultimately derived from nonliving matter, "dust" of the ground.
- <sup>73</sup> cf. Proverbs 8:26: "... before he had made the earth with its fields, or the first of the *ʿafar* of the world ..."
- <sup>74</sup> Romans 5:12-21. In this context, physical descent is irrelevant, for the old humanity (not necessarily for old Israel), just as it is for the new. Adam's being called "the first man" does not refer to biological genealogy, as can be seen in Christ's being "the second man" and the "last Adam" (1 Corinthians 15:45-47). John 3:8.
- <sup>75</sup> cf. Exodus 3:14: "God said to Moses, 'I AM who I AM. ... Say this to the people of Israel, I AM has sent me to you'; cf. Jesus' use of "I am", shocking his Jewish listeners, e.g. John 8:58.
- <sup>76</sup> Isaiah 43:7, cf. note 7.
- <sup>77</sup> Genesis 2:7; cf. Job 33:4, "The *rooagh* of God has made me; the *neshamah* of the Almighty gives me life"; Job 32:8, "It is the *rooagh* in man, the *neshamah* of the Almighty, that gives understanding"; cf. Proverbs 20:27.
- <sup>78</sup> We obviously do not have a mature theory for our suggestion that Adam's receiving the spirit [*neshamah*] of life represents his being born again, nor for our support of the postulate of Adam not being the first man. But neither have we encountered any other satisfactory theory which does not make myths out of inspired Scripture or

- conflicts with science. Kline, M.G. (1996), "Space and Time in the Genesis Cosmogony", *Persp.Sci.Christ.Faith* **48**, 2-15 allegorizes Genesis 1-2 by his "Two-Register Cosmogony", agreeing with Scriptural theology and avoiding contact with science. But if God is the Author of both creation and Scripture, the implication that this poetic-spiritual interpretation rules out a parallel interpretation on an historical-narrative level is not compelling. It is on this level that we want to propose an interpretation for discussion, without denying the feasibility of a spiritual-allegorical reading.
- <sup>79</sup> Whenever the Bible talks of humans (or even animals) being formed [*yatzar*] by God, it also mentions their particular mission, cf. Psalm 139:13,16 (David); Isaiah 43:7,21 (God's sons and daughters); 49:5 (the Messiah); Jeremiah 1:5.
- <sup>80</sup> 1 Corinthians 15:47,45.
- <sup>81</sup> Pace, N.R. (1997), "A Molecular View of Microbial Diversity and the Biosphere", *Science* **276**, 734-740.
- <sup>82</sup> Steller, H. (1995), "Mechanisms and Genes of Cellular Suicide", *Science* **267**, 1445-1449; Thompson, C.B. (1995), "Apoptosis in the Pathogenesis and Treatment of Disease", *Science* **267**, 1456-1462.; Raff, R.A. (1996), *The Shape of Life* (Univ.Chicago Press, Chicago, IL); Frade, J.M. & Michaelidis, T.M. (1997), "Origin of eukaryotic programmed cell death: a consequence of aerobic metabolism?" *BioEssays* **19**, 827-832; Wallach, D. (1997), "Placing death under control", *Nature* **388**, 123-126.
- <sup>83</sup> Junker, R. (1994), *Leben durch Sterben?* (Hänssler, Stuttgart-Neuhausen, Germany; ISBN 3-7751-2226-5) claims Romans 5:12-21 and 8:19-23 require all death to result from Adam's fall. But: (1) Old Testament believers are saved through Christ's substitutionary sacrifice apparently effective backwards in time. Christ, "the second man", is the first and typical representative of the new human race of those having spiritual life - before and after his time; Adam, "the first man", is the typical representative of the old human race of the spiritually dead, presumably before and after his time. (2) Sin is seldom followed immediately by death, but by occasions for repentance. (3) Sin is not inherited, but all die because "all men sinned". Death entering the human world "through Adam" and spreading "to all men" is a spiritual-typological link. (4) Satan sinned "from the beginning" (John 8:44), before Adam; he tempted him. Death was possible and plausible before Adam. (5) The non-human creation's predicament is not linked to Adam's fall, but to Satan, "the god of this world" (2 Corinthians 4:4).
- <sup>84</sup> cf. note 30.
- <sup>85</sup> Genesis 1:26; 1 Timothy 4:4.
- <sup>86</sup> Romans 8:28.
- <sup>87</sup> A "gap theory" is not implied, nor is a primeval or intermediate "chaos" in the mythical sense. God's entirely good creative activity is continually operative from the Big Bang 13.5 Ga ago to this day, while Satan's corrupting creation began with his fall before the primeval earth's state depicted in Genesis 1:2 and continues today.
- <sup>88</sup> Genesis 2:17; 3:16,20-21.
- <sup>89</sup> Genesis 3:15,20,21; 1 Corinthians 15:54.
- <sup>90</sup> Prophecy may refer to past, present, or future.
- <sup>91</sup> Allis, O.T. (1949), *The Five Books of Moses* (Presbyterian and Reformed Publ. Co., Phillipsburg, NJ); Archer, G.L. (1964), *A Survey of Old Testament Introduction* (Moody Press, Chicago, IL); Maier, G. (1975), *Das Ende der historisch-kritischen Methode* (Brockhaus, Wuppertal, Germany); Newman, R.C. (1984), *Evolution-Religion and the Genesis Account* (Interdisciplinary Biblical Research Institute, Hatfield, PA; Res.Report No. 23); Young, E.J. (1989), *An Introduction to the Old Testament* (Eerdmans, Grand Rapids, MI); MacRae, A.A. (1994), *JEDP: Lectures on the Higher Criticism of the Pentateuch* (Interdisciplinary Biblical Research Institute, Hatfield, PA); Newman, R.C. (1995), "Scientific and Religious Aspects of the Origins Debate", *Persp.Sci.Christ.Faith* **47**, 164-175.
- <sup>92</sup> Seely, P.H. (1991, 1992, 1997), note 16; Russell, J.B. (1997), note 16; Tanner, W.F. (1997), "'Planet Earth'? or 'Land'?", *Persp.Sci.Christ.Faith* **49**, 111-115.