

# Evolutionary Theories and the Simple Simon Syndrome

by

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On October 22, 1996, John Paul II addressed the Pontifical Academy of Sciences on the origin of life and evolution. He argued that the results of fifty years of investigative studies in various branches of science have moved the Church's receptivity to the theory of evolution beyond its tentative response in *Humani Generis* (1950).<sup>1</sup> The fact that a half century of scientific research independently conducted in varying fields has unanimously corroborated the theory is, in the Pope's opinion, "a significant argument" in its favor.

John Paul also issued an important proviso that, unfortunately, was not included in much of the media coverage of his statement. He insisted that, although the assembled research "leads to the recognition of more than a hypothesis in the theory of evolution,"<sup>2</sup> not every interpretation of the theory is compatible with the truth of Divine Revelation about the identity of the human person. The methodology that is employed to articulate the evolutionary theory cannot "totally prescind from Revelation with regard to the question it raises."<sup>3</sup> In fact, since many of the current methodologies behind evolutionary science neglect the question of the non-material origin of the soul, the Pope argues that it is legitimate to speak of *theories* of evolution. Three examples are mentioned: a reductionist, a materialist and a spiritualist theory.<sup>4</sup> Of the three, only the latter is compatible with revealed truth.

Toward the end of evaluating these various theories of evolution in a faith context, this essay will, first, define the Simple Simon Syndrome, second, outline salient features of the Pope's conception of a spiritualist theory of evolution, and, third, evaluate the soundness of a theory of evolution based on a reductionist philosophy.

## I. The Simple Simon Syndrome?

You remember Simple Simon. His follies were recounted in one of those childhood nursery rhymes we recited as children. He was the fellow that never

seemed to employ a proper means to his intended goals. He wanted to buy some pies but lacked the money to do so. He wanted to feast on wild duck but wasn't a skillful enough marksman to shoot the bird either before or after it took flight. But perhaps his silliest *faux pas* was when "he went fishin' for to catch a whale, and all the water he had got was in his mother's pail." British physiologist Sir Francis Walshe was probably the first to diagnose the Simple Simon Syndrome in reference to the reductionist philosophy that drives much of the methodology, interpretations, and applications of contemporary evolutionary theory.

We all know the nursery tale of Simple Simon who went fishing for whales in his mother's pail. I am happy not to find myself in the ranks of those scientific Simple Simons who believe that with better hooks, lines, baits, pitched into the same pail, they will fish out from it the answer to the riddle of the soul and the mind. The whale isn't in the pail!

We live in at least two worlds, the world of the humanities and the world of science. The former cannot be reduced to the latter.<sup>5</sup>

Walshe's insights echo those of Pius XII's teaching in *Humani Generis* and John Paul II's advice in his Oct. 22nd address. All of these judgments provide a sound criterion to help us assess the legitimacy of the reductionist and materialist-driven theories of evolution which abound today. For our purposes, the standard used to scrutinize a reductionist theory of evolution will be integrated under the one rule, 'Evolutionary theories ought to avoid the Simple Simon Syndrome.'

## II. A Spiritualist Theory of Evolution: Compatible with Revealed Faith

Isn't a spiritualist theory of evolution an oxymoron? John Paul II doesn't necessarily think so. He argues that contradictions that arise *prima facie* may prove, after closer scrutiny, to be only *apparent* conflicts.<sup>6</sup> Ultimately, a spiritualist view of evolution must demonstrate that the physical continuity which is typically the focus of evolutionary research need not be in opposition to the ontological discontinuity associated with the first appearance of the human person. If empirical scientists are true to the strengths and limitations of their particular areas of expertise, they will realize that, while the "moment of transition to the spiritual" cannot be empirically proven, science can "discover at the experimental level a series of very valuable signs indicating what is *specific* to the human being" (emphasis mine).<sup>7</sup> At that point, those involved in experimental sciences must entrust their research to the discipline of philosophy which is competent to explain what the ontological leap means in terms of spiritual behavior. Philosophy can interpret the meaning of man's natural capacities and activities that include metaphysical knowledge, self-awareness, self-reflection, moral conscience, freedom, and aesthetic and religious experience.

But the interdisciplinary nature of an adequate evolutionary science doesn't stop there. Scientists and philosophers must then submit their findings to theologians whose expertise it is to demonstrate the ultimate meaning of the unique capacities of the human being. The proper provenance of theology is to reflect on the meaning of the embodied spirit of the human being as it is made in

God's image, divinized by Christ's salvific acts, and destined for eternal life in God. For this reason, the Pope insists that the Church's openness to an evolutionary theory turns on, first, whether the hypothesis recognizes what Scripture tells us about the temporal and eternal destiny of the body-soul totality of the human being. Second, ecclesial receptivity depends on efforts to reconcile this revealed truth with scientific data.<sup>8</sup>

It follows, therefore, that the litmus test for the adequacy of various philosophies that drive the methodologies used to argue evolution is that they must exhibit a *weltanschauung* that is compatible with revealed truth about the human person. A critical point is this. A theory of evolution that is in harmony with Christian Revelation must acknowledge that the mind or non-material nature of the human being cannot emerge from "the forces of living matter" nor come to be as "mere epiphenomenon of living matter."<sup>9</sup> John Paul ratifies the point made by Pius XII in *Human Generis*. While the evolution of preexistent matter may explain the origin of the human body, it cannot account for the presence of the human soul and its spiritual powers, nor can it ground human dignity. Since spiritual powers and functions always presuppose a spiritual source, the spiritual powers of man's intellect and will could not have evolved from non-human or brute animals. Matter is the antithesis of spirit in the sense that there is no potency in matter for the spiritual. The Pope implies, therefore, that a scientist who is a proponent of an evolutionary theory compatible with revealed faith will admit that there are things about the human species that he is unable to prove empirically. When reflecting on the first primates who appeared in the evolutionary timeline and who were capable of intellectual activities peculiar to the human species, the scientist needs to be open to the reality that the capacity for those activities originates only indirectly in the material body disposed to that kind of activity through an evolutionary process. Specific human behavior follows most directly from the spiritual principle or form of that body, an intellectual soul immediately created by God. Since there is no potency in matter for the spiritual, a being could not carry out intellectual pursuits, be creative, or freely make choices without an intellectual soul—even if his body had developed to a proportionately complex stage.

### III. A Reductionist Theory of Evolution

By reducing higher beings and their functions to lower beings and their functions, a reductionist theory of evolution is an attempt to demonstrate how one type of organism evolved into or became another organism. In this view, the essential differences between living and nonliving beings and between the various species of living beings are quantitative not qualitative, accidental not essential. In the case under scrutiny, the substantial differences between humans and animals can be explained in terms of differences in degree, not kind. Essential differences between species are not substantial changes but accidental ones. Take any human capacity or function whether physiological or physical and, according to a reductionist perspective, the only difference in the way that it is present in animals as opposed to humans is that human beings possess *more* of the given quality or

function, animals less of it. Accordingly, a human being's intellectual learning represents a higher expression of an animal's conditioned reflex activities. And an animal's conditioned reflex activities are a higher manifestation of a plant's stimulus-response pattern or tropism. The dissimilarities of capacities and functions of different species are accidental ones based as they are on more or less (quantity). Consequently, all lines of demarcation on the continuum of living species are blurred. As Carl Sagan illustrates in his statement that there are "no important differences between apes and man,"<sup>10</sup> a reductionist evolutionary science minimalizes or denies species or categorizations according to essential differences.

A contemporary reductionist theory of evolution has its most immediate roots in 19th century thought. Carl Sagan's remark is merely a take-off of a century's old idea expressed by Thomas H. Huxley (1825-1895): "No absolute structural line of demarcation . . . can be drawn between the animal world and ourselves; and I may add . . . that the attempt to draw a psychical distinction is equally futile, and that even the highest faculties of feeling and intellect begin to germinate in lower forms of life."<sup>11</sup> In this perspective, all living beings are reduced to the same cellular or chemical substrate. The same kind of reasoning is what prompted 1937 Nobel Prize winner Albert Szent-Gyorgyi to argue that because of "the great, fundamental unity of living nature," there is "no *real* difference between cabbages and kings, we are all recent leaves on the old tree of life."<sup>12</sup>

An article entitled "What Does It Mean To Be One of Us?" in the November, 1996, issue of the *Life* magazine combines a commentary by Kenneth Miller with the intriguing photographs of Lennart Nilsson.<sup>13</sup> The Nilsson photos, "an interspecies family album," provide a comparative study of the exquisite choreography of parental development amongst human and non-human preborns. My critique will focus on Miller's narrative because in it he constructs the philosophical-scientific window through which he invites the reader to view the photos.

In his verbal assessment of Nilsson's photos, Miller talks very much like a reductionist. He argues that, in attempts to uncover "our identity as *Homo sapiens*,"<sup>14</sup> rather than concentrating on differences between man and lower species, we ought first to understand how humans are *like* other animals. Only when we see our resemblances to other species will the differences between us become obvious.

Miller rightly contends that Nilsson's photographs make believers out of laymen faster than would any pedantic biological lecture on the drama of evolutionary science. These pictures are worth much *more* than a thousand words. They demonstrate almost at a glance the kinship which humans and nonhumans share. The photos confirm that, from a comparative anatomy view, we're all one big family. Then Miller explains that the similarities of the prenatal developmental schema amongst various species of vertebrates points to their shared ancestry. Whether it's the prenatal development of a pig, chick, monkey or human being, Nilsson's photos help us to see how "nature is retracing an eons-old learning curve"<sup>15</sup> in the successive stages of their embryonic and fetal development. All stages of vertebrate prenatal development from the multicelled

sphere, the tubular body, the segmented body with notochord, etc., mirrors the genetic-directed choreography of the evolutionary process. 700 million years ago, the multicellular organism evolved into a tubular marine creature. Tubular marine animals evolved into animals with segmented bodies and a flexible spinal chord or notochord. 500 million years ago, animals with segmented bodies evolved into the first vertebrates, primitive fish. From mutant fish we got amphibians, amphibians begat reptiles, reptiles begat mammals. Primates arose from mammals and the direct ancestors of human beings arose from primates.

Up to this point, we cannot say that there is an intrinsic incompatibility between Miller's account of the evolutionary history of our bodies and the question of the origin of the human soul. He appears to respect the limits of empirical science. However, when Miller returns to the subject of the uniqueness of the human being, the inadequacy of a reductionist view rears its head. "Science," he admits, "has been nibbling away at our sense of uniqueness." Researchers in the wild can give ample examples of very human-like behavior amongst subhuman beings such as monkeys and elephants. Besides learning some sign language, chimpanzees (who, he claims, share 99.9% of human genes) "invent simple tools, use herbal medicines, jockey for political advantage and teach etiquette to their young."<sup>16</sup> Elephants, on the other hand, have been seen to "observe a moment of silence near the skeletons of fallen herdmates and carry off bits of bone as mementos."<sup>17</sup> Abandoned young birds don't sing "more than a few faltering notes" indicating that this activity is learned from its elders rather than being a behavior arising solely from instinct.<sup>18</sup>

Miller's examples from the wild raise some questions. That researchers actually witnessed the animal behavior just described is not incredible. But what is not convincing is the interpretation he places on them. Take the elephant's actions, for example. Is there any way of knowing empirically that the exhibited behavior among the herdmates is a lesser (or equal?) degree of the same kind of respect among humans? But that he does opt for these interpretations provides a clue as to Miller's hidden or not-so-hidden agenda. From these examples, he concludes that human beings aren't so different from other animals after all. Even the intellectual or spiritual activities traditionally ascribed only to humans exist at some startlingly high degree in subhuman species. Therefore, dissimilarities between humans and other vertebrates are "more a matter of degree than of kind."<sup>19</sup> Even in man's intellectual achievements, he advises, we ought to recognize our closeness to "the less accomplished animals." In other words, man may be much smarter than the chimpanzee, but that must be due to the small percentage of genetic differences between the two primates not to any essential difference involving an intellectual soul. Since the needs for the types of activity that make the human being outstanding in his functional abilities are from lower species, we ought to respect all life. All life is sacred, Miller, argues, because (quoting Nilsson approvingly) "we are all the same thing."<sup>20</sup>

With these conclusions, Miller's commentary illustrates the principal flaws in a reductionist theory of evolution. First, it effaces the commonsense notion that living things are represented by a hierarchy of beings — plants, animals, humans — each of which exemplify substantial or essential differences from the rest.

Second, if the differences between man and the other species of vertebrates is a matter of more and less, positing an intellectual soul for the human species is an unnecessary assumption in ascertaining the meaning of life. But without at least the recognition of the spiritual nature of the human being, a reductionist theory of evolution cannot render a total view of what it means to be human; it reduces the human being to matter only. Third, a reductionist science obfuscates or neglects altogether the recognition that the origin of man's soul lies outside of the parameters of scientific expertise. It insists on finding the whale in the pail. In short, a reductionist view of evolution suffers from the Simple Simon Syndrome. Accordingly, behavior such as thinking and willing does not arise from the substantial form or human soul of the person but from a material-based complexity. Genes or genetic mutations specific to *Homo sapiens* are the sole source of the level of the intellectual and volitional activities traditionally attributed to the human being. That's why reductionists claim that chimpanzees reason but just not as well as human beings. Finally, as we will discuss below, if practice should follow from theory, a reductionist view of evolution has the potential to lead to ethical practices that could only be described as barbaric. The difference between identifying the human being as a glorified animal rather than as a person is the difference between a moral order based on human dignity and a society lacking a moral anchor altogether.

#### **IV. A Critique of Reductionism: Behavior That Makes Human Beings Unique**

Based on the principle that the activities proper to a being follow from its essence, the most direct way to critique Miller's reductionist view of evolution is, first, to identify from a commonsense view what kind of activities appear to be unique to humans.<sup>21</sup> The fallacy of a reductionist view of evolution that claims that human intellectual behavior is a more complex example of animal rational activity shows up immediately in the following capacities that are distinctly human. As the analysis will make clear, these activities are not a matter of a human ability differing from a corresponding animal by dint of degree, as Miller and other reductionists argue. Animals simply *lack* the capacities for these activities altogether. Second, when we inquire as to the source of such metaphysical activities, we must look for a proportionate wellspring. Spiritual activities, like the ones described below, manifest a spiritual nature. They are the particular functions of a human being's intellect and will which inhere in the spiritual principle of the soul.

##### *1) Only human beings engage in symbolic communication.*

Language is a sign that represents thought. But it is a construed sign not a natural one such as smoke or fire. Language is a symbol arbitrarily assigned which leads the mind to the knowledge of something else, namely, the reality behind the symbol. Therefore, we can conclude that

the intellect is able to transcend the physical limits of matter by arbitrarily bestowing upon a thing a conventional term which in no way is necessarily related to the thing signified. That is, there is no intrinsic necessity that such a natural thing as a flower be

given the name "rose." . . . Since the human intellect, in thus transcending the conditions of matter, communicates in a suprasentient way, it must itself be a suprasentient or spiritual power (for a things acts according to its nature).<sup>22</sup>

Communication between animals is very much confined to the concrete and the immediate. Therefore, although animals produce sounds, they do not communicate in a meaningful way. They lack an intelligence capable of abstraction and cannot, as a result, recognize what an arbitrarily assigned symbol represents. Similarly, idiomatic expressions like "It's six of one and a half dozen of another" would stump any creature lacking a suprasentient intellect. For the same reason, animals would not understand or create synonyms or homonyms, equivocation, riddles, or conundrums. If we took a chimpanzee for a Sunday drive, we could not depend on it to help us decipher the clever personalized license plates that are evidence of our ability to play with the language. Animals have left no records of inventing symbols; humans demonstrate a proliferation of symbols as chemistry and mathematics demonstrate.

Perhaps the most definitive indicator of differences between animal and human communication is this: only human beings develop languages. Of the over 8,000 extant languages, each requires intellectual skills on the part of the speaker to master its grammar. But there is no such intellectual creativity in the realm of animal talk. A bark of a dog is the same today as it was eons ago; a Persian cat in France will have the same basic meow as its American counterpart; chimps which have been trained to say a few words cannot master the demands of grammar and syntax required by every human language.

Finally, there are those who emphasize that animals do understand things when people speak to them. Well that may be true, but not in the human sense of understanding. Human knowledge includes self-consciousness as well as consciousness. A rat may know that it is wet, but it does not know that it knows it. I know that I am wet from walking in the rain, and I know that I know it.

### *2. Only human beings are scientific.*

Any quantitative differences in the ability to master science lies within the human species. It's not as if a chimpanzee is a better botanist than a grasshopper. But Einstein was definitely a better scientist than my high school physics teacher. As genetic engineering and the human genome project prove, the human species is even capable of manipulating its heredity and directing its evolution. This is all possible because, first, human beings have what animals lack: intellects that are capable of abstracting universals from particulars. All science deals with the universal component of things. For example, every molecule of alcohol is C H OH. Second, only human beings are able to grasp causality. Animals are not scientists or philosophers because they are not capable of grasping the intellectual concept of cause and effect which is essential to all scientific and philosophical knowledge. In short, animals are not capable of ideas. Whitehead said it well: "Science and philosophy belong to men alone."<sup>23</sup>

### *3. Only human beings create works of art.*

It has been said that art is the signature of man. G.K. Chesterton quipped that, although archeological digs have turned up pictures of reindeer drawn by prehistoric man, no digs will ever uncover a picture of man drawn by a

prehistoric reindeer! When you think about it, since much of primitive art is linked to symbolism, it should not come as a surprise that it is exclusive to man. Sir Julian Huxley opines that "One of the greatest mysteries of human evolution is the sudden outburst of art of a very high quality in the upper Paleolithic period."<sup>24</sup> Furthermore, no animal species can boast of a Mozart, a Michelangelo, or a Shakespeare.

4. *Only human beings are religious.*

Durkheim's encyclopedic study, *The Elementary Forms of the Religious Life*, shows that, as long as there have been humans around, they have been believers. Anthropologists confirm that every society exhibits a religious tendency. Again, it is not a matter of anthropoids being less religious than humans. There is no evidence that anthropoids are religious at all, nor interested in worshipping a deity whom they may desire to appease, praise, or thank. Degrees of religiosity exist only between members of the human species. William James declared that religion is a phenomenon exclusive to the human being, something "we meet nowhere else."<sup>25</sup>

5. *Only human beings make tools and complex machines.*

So as not to get embroiled in a discussion about whether an animal's use of a twig is tantamount to being a tool-maker, one should begin by defining a tool as an artificial object. And the reason why some have suggested that *homo faber* is the most definitive way to describe man is that only man both fashions tools and makes tools out of other tools. Further, only man using many tools constructs complex machines. A hammer, drill, screwdriver, snowblower, windmill, and spacecraft all bear human signature. No evidence exists for comparable artifacts designed by animals.

6. *Only human beings have a history.*

When an historian records history, he doesn't record everything that happens within a given block of time, but he does use a meta-historical principle in his process of selectivity that reflects what he believes is important or is of value. Such attention to the moral aspect of events indicates that writing history is a specifically human endeavor because it presupposes a spiritual nature capable of metaphysical and moral reflection. As Azar reasons, "Why is it that, of all beings, only man has a history; why is it that no other animal is aware of its past? Inasmuch as he has a body . . . , man is temporal; and without time, there would be no history . . . Further, because man has a spiritual intellect, he can use matter as a means in his development, this progress constituting his history."<sup>26</sup> Having a history also implies that man has a future, that he is basically a being in process whose development will itself become his history. Unlike inanimate things which are complete or finished from the start, development in humans is always incomplete and, therefore, capable of becoming more perfect. For theologians like Augustine, Whitehead, or Teilhard de Chardin, history is evidence that time and temporal activities are both guided by God and tending toward God.

7. *Only human beings are free persons.*

Only a human being is created for his own sake. That is why every person with even a minimally developed moral sense recoils from being used solely for someone else's pleasure or welfare. Each human being is an end in itself and



should never be used as a mere means to another end. As free agents, human beings are most themselves when in freedom they choose among goods presented by the intellect or choose not to choose at all. Only human beings choose a spouse from among many candidates and then choose to commit themselves for life to this other person, to love and to cherish him until death. Only human beings choose one profession among many and serve family and society by functioning in that profession. While animals are driven to copulate when in heat, only humans are capable of choosing whether to engage in or abstain from sexual relations. Only the human being is free to act morally by choosing life, loving God and others, forming friendships, entering into communion with others, working for a society based on moral values.

While animals have certain inclinations or instinctual drives which automatically bring them to their fulfillment, in the human being, by contrast, there are no such pre-programmed guides for perfection. Man must find personal integration and fulfillment by choosing to act so as to regulate the basic human inclinations which frequently war against one another.

Animals eat, sleep, defend themselves, and reproduce not because they choose to but because they are responding to instinctual drives. They act instinctually; they do not exercise freedom of choice and, therefore, are not held morally responsible for their actions. Correspondingly, if animals kill their own young, they are not brought to trial for murder. Human beings, on the other hand, with their capability of recognizing good and evil, are held accountable for what they choose.

Given the rational or spiritual nature of the specific capabilities of the human being we have just described, we must conclude that the only proportionate source for self-awareness, reason, freedom, and imagination is a rational or spiritual soul, unique to the human species. The human being, while very much a part of nature, transcends the rest of nature by virtue of his definitive peculiarity. Only man is an embodied spirit or an inspirited body.

### Conclusion

Perhaps the most telling commentary against a reductionist view of evolution is that, in denying the spiritual nature of man and rejecting the spiritual faculties of the intellect and the will, it disavows human freedom. But in this case, if practice follows theory, a reductionist view of evolution has some devastating consequences for ethics. If the human person is not free, he is also not a moral being, not accountable for the good and evil he realizes in his actions. If the human being is unidimensional, that is, matter only, if there are no substantial differences between us and animals and the rest of nature, if what gives the human being an edge over other primates is linked to genetically-driven superiority producing a bigger brain and better larynxes rather than being a thinking, free person, what grounds the dignity of such a glorified animal? And if human beings do not possess a dignity specific to them arising from their spiritual nature, is it fair to rate present day genocide or that of Adolf Hitler as an atrocity? If animals can be slaughtered with impunity, why condemn the slaughter of

humans? Why not condone cannibalism?

If we reduce man to biology and strip him of his free will, why should we dedicate hospitals and clinics for the care of the sick and the aged? Why should we bother to be truthful in our dealing with others, why should we be respectful of others, their lives, goods, wives? Why should we honor and obey our parents, or respect our spouses or children or siblings? If man is determined and not free to choose, why would we even need a moral code like the 10 Commandments?

If man is not, by nature, able to know the truth and love the good, if he is only a material being that has struck it lucky with a developmental history marked by chance and necessity, devoid of teleology, then why shouldn't we declare God dead, a human projection, a vestige of a primitive mind which was woefully ignorant of what evolutionary theory now teaches us about ourselves? If God is dead, what's to anchor a democracy founded on the notion of "one nation under God with liberty and justice for all?" If God is dead and the divine and natural law defunct, then why shouldn't we be able to justify just about every sort of evil deed?

### References

1. John Paul II, "Message to Pontifical Academy of Sciences on Evolution" (Revised Translation), *Origins* Dec. 5 (1996): 415 (4.2).
2. *L'Osservatore Romano* English language editor, Fr. Robert Dempsey, noted that rather than translating the French phrase ["... de nouvelles connaissances conduisant a reconnaitre dans la theorie d'evolution plus qu'une hypothese"] as "new knowledge leads to the recognition of more than one hypothesis," a translation more in line with the point being made by the Pope would be "new knowledge leads to the recognition of more than a hypothesis in the theory of evolution," or perhaps more smoothly translated: "new knowledge leads to the recognition that the theory of evolution is more than a hypothesis." (*Catholic Register*, December 1, 1996, p. 3).
3. *Ibid.*, p. 415 (4.5).
4. *Ibid.*, p. 415 (4.1).
5. Sir Francis Walshe, "Some Views Upon the Nature of the Relationship Between Mind and Brain," *The Journal of Medical Education*. XXXIII (1958): 1116.
6. "Message," p. 414 (2.1).
7. *Ibid.*, " p. 415 (6).
8. *Ibid.*, p. 414 (2).
9. *Ibid.*, p. 415 (5.5).
10. Carl Sagan, *The Dragons of Eden: Speculations on the Evolution of Human Intelligence* (New York: Random House, 1977), p. 210.
11. Thomas Huxley, *Essays of a Humanist* (New York: Harper and Row, 1964), p. 110.
12. Albert Szent-Gyorgyi. *The Cell and Protoplasm* ed. by Moulton (Washington, D.C.: American Association for the Advancement of Science, 1940), p. 160.
13. Kenneth Miller and Lennart Nilsson, "What Does It Mean To Be One of Us?" *Life* Nov. (1996): 38-56.
14. *Ibid.*, p. 50.
15. *Ibid.*, p. 56.
16. *Ibid.*, p. 50. Since the mapping of the human genome project has not been completed, it seems a bit premature to comment with certainty about the percentage of genetic similarity between chimps and humans.
17. *Ibid.*, p. 50-51.
18. *Ibid.*, p. 51.
19. *Ibid.*, p. 54.
20. *Ibid.*, p. 56.