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RELIGION, SCIENCE, AND CULTURE ON HUMAN ORIGINS

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Abstract

The most recent anthropological and genetic research has shed new light on human origins and contributed to seemingly rule out the concepts of 'Mitochondrial Eve' and 'Y-Chromosome Adam' as our *Most Recent Common Ancestors*. In addition, it has posed new questions about how many ancestors human beings have and whether the Christian doctrine on the origin of human beings and original sin still makes any sense. To address these questions we need to consider not only the latest population genetics data, but also the contributions of other sciences, such as cultural and biological anthropology. This paper reviews the current state of research and attempts a philosophical reading of the data, taking into account the Christian teaching on human origins and original sin.

Keywords: monogenism, polygenism, original sin, human origins, human species

1. Introduction

Following some recent scientific papers, such as 'Inference of Human Population History from Individual Whole-Genome Sequences' [1], some authors have pointed out the possibility of harmonizing the Christian doctrine of original sin with the new scientific data [2]. These papers infer that the existence of a group of a few thousand individuals would be required, about 40,000 years ago, to account for the whole human genome of today. A portion of that group would have remained in Africa and the rest, less numerous [3], would have left the continent.

To study these claims and the difficulties regarding the Christian doctrine of original sin, I will employ a broader approach than the purely genetic one. In this paper, I will focus only on the Christian doctrine and will not, therefore, take into consideration other religious perspectives, like the Jewish understanding of sin [4] and the Muslim comprehension of evil [5], since they are not connected to the doctrine of original sin. In addition, I will not examine the proposals of those theologians of different Christian confessions who do not consider the original sin as a consequence of a historical fact, that is, a sin committed by men

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and transmitted by propagation (not by imitation) to all other human persons who come into existence after the first trespass, in a way that "the state of original sin is in everyone as his own" [Catechism of the Catholic Church 404, and The Council of Trent, 5th Session, Decree concerning Original Sin (June 17, 1546)]. Finally, although, by and large, the Protestant approach regarding the nature of sin is significantly different from the Catholic and Orthodox ones, I will not take into account those differences because they are not relevant in this paper, insofar as it considers the original sin connected to a historical fact.

2. Religious view on Adam's original sin

The existence of evil in some terrible events, like the Shoah or Holocaust, is something on which everyone seems to agree, although there can be many differences in the interpretation. For some atheists, the reality of evil is used as an argument against the existence of God [6]; for some Christians, however, evil is a problem or enigma that can only be clearly viewed under the light of faith. Yet, in every event, the problem of evil as a tight spot between atheists and Christians is presented as a false dilemma [7].

Christian faith is neither a kind of home remedy that blurs the existence of evil, nor an accommodating attitude that prevents any conflict with scientific interpretation, nor even an act of irrationality that opposes Science [8]. The knowledge of faith, instead, is open to Science, whose autonomy and contribution to purify the faith's interpretation of the data are respected [9] and appreciated by the very faith [10].

Analogously, scientific activity tends to recognize its methodological limitations and the existence of some realities that are difficult to address from its methodology [11, 12], but for which a rationality that is broader than the merely scientific one could also provide some help. The question of evil is a well-formulated question that refers to testable events [13], for which science has no complete answer.

But, what would happen if the existence of evil were *necessarily* associated to the sin committed by the first pair of human beings? (According to the *Catechism of the Catholic Church*, 1850: "Sin is an offense against God: 'Against you, you alone, have I sinned, and done that which is evil in your sight' (Psalm 51.6). Sin sets itself against God's love for us and turns our hearts away from it. Like the first sin, *it is disobedience, a revolt against God through the will to become 'like gods,' knowing and determining good and evil* (Genesis 3.5). Sin is thus 'love of oneself even to contempt of God' (Saint Augustine, CIV, 1, 14, 28)".) Could Science then say that there was no first couple and therefore put into question Christian teaching about sin? To give a proper response to that question, two implicit assumptions should be examined:

1. That Science can prove there has never been a first couple.
2. That the only manner Christian doctrine has to explain the existence of sin in the world is by means of monogenism.

The first assumption is not easy to corroborate. It is true that scientific data point out the necessity of a significant group of individuals so as to account for the whole human genome of today.

"Since species differ in numerous genes, a new species cannot arise by mutation in a single individual, born on a certain date in a certain place. (…) Species arise gradually by the accumulation of gene differences, ultimately by the summation of many mutational steps which may have taken place in different countries and at different times. And species arise not as single individuals but as diverging populations, breeding communities and races which do not reside at a geometric point, but occupy more or less extensive territories." [14]

But, due to the current way of understanding evolution of species we should reconsider the previous Dobzhansky's quote. Neodarwinism is not the only way of understanding the origin of species. Current scientific data and the same theory of evolution seem to point to an origin of human species around a particular space and time. All evolutionary theories need to be explained by common descent at one point or another.

This means that if we just look into certain parts of the genome, monogenism is feasible. Scientific monogenism implies that some parts of the genome can be provided by only a few individuals at some point in history, not that one or two individuals can account for the human genome. There is no scientific evidence whatsoever that there was a time in which there were only two individuals.

"Further, there is no scientific evidence in favor of the sudden origin of the human species; indeed to the extent that humanity is characterized by a cluster of genotypic, phenotypic, or behavioral-cultural traits, there is a theory-based presumption against it. It seems, therefore, unlikely (on the basis of scientific evidence) that there was a single first couple which emerged alone from a biologically prehuman population to become the ancestors of all later human beings. Modern science suggests not a monogenetic, but a polygenetic, origin for man." [15]

Scientifically, proving monogenism does not seem easy, but nor does it seem possible to support a polyphyletic origin of human species. *Monophyletism* of the human species (a common origin around a group) seems the only valid hypothesis to understand human origins.

Regarding the second assumption, it should be noted that, although there has been a tradition that tends to affirm monogenism, neither the Catholic Church nor the other Christian confessions have ever pronounced it dogmatically [John Paul II, General Audience, January 29, 1986; Letter of the Secretary of the Biblical Commission to Cardinal Suhard, Archbishop of Paris, January 16, 1948]. Indeed, the well-known statement of Pius XII does not focus the question of sin on the Genesis narrative of man's creation, but on the Pauline affirmation of Jesus Christ as the new Adam, and explicitly avoids a definite bond with monogenism: "When [it comes to] polygenism, the children of the Church by no means enjoy such liberty [to adhere to such a doctrine (liberty they

do have regarding evolution)]. For the faithful cannot embrace that opinion which maintains that either after Adam there existed on this earth true men who did not take their origin through natural generation from him as from the first parent of all, or that Adam represents a certain number of first parents. Now *it is in no way apparent how such an opinion can be reconciled with that which the sources of revealed truth and the documents of the Teaching Authority of the Church propose with regard to original sin*, which proceeds from a sin actually committed by an individual Adam and which, through generation, is passed on to all and is in everyone as his own." [16]

Under this light, this paper centres on showing current scientific data that — and this is the point of view advocated here — seem to be more compatible with monogenism than polygenism for scientific, philosophical, and theological reasons. In any case — this is an important point — speaking of the doctrine of original sin is different than talking about the monogenic origin of man; even if only one couple was found at the origin of humanity, how would we know that they committed the first sin?

It could be said that, lacking a better explanation of the origin of man and the origin of evil in the world, the current understanding is still valid. Yet, it is important to investigate and verify whether the detected anomalies are such as to indicate a greater likelihood of polygenism. It would not be wise to remain standing on a branch that has started to rot.

3. Does human species imply a kind of novelty?

According to the most widely contrasted position on biological evolution, many different processes, like mutations providing genetic variability, natural selection leading to statistically larger output of offspring in some genetics combinations, mechanisms of isolation, sexual selection, founder effect, and so on [17], need to be assessed in order to understand how evolution is taking place as well as where and when the processes of specification occur [18].

In addition to this, it is problematic to draw a firm line between human and non-human. In retrospect, the lineage of human evolution is a continuous one, and many biologists would argue that this is also true of consciousness, intelligence, and social bonding. All of them would not emerge as a sudden event, but would have developed gradually, as our ancestors became more and more human-like.

So far, this explanation is supported by many scientists; but a problem arises when some authors argue that the blind forces of nature would be sufficient to account for evolution. (Regarding this idea, the teaching of the Catholic Church, without committing itself to debatable scientific positions, emphasizes that evolution is compatible with creation and Providence, and therefore it is not only a matter of blind forces. John Paul II, General Audience, *Humans Are Spiritual and Corporeal Beings*, 16.IV.1986, *Insegnamenti* **IX/1** (1986) 1041: "It can therefore be said that, from the viewpoint of the doctrine of the faith, there are no difficulties in explaining

the origin of man in regard to the body, by means of the theory of evolution. But it must be added that this hypothesis proposes only a probability, not a scientific certainty. *However, the doctrine of faith invariably affirms that man's spiritual soul is created directly by God*. According to the hypothesis mentioned, it is possible that the human body, following the order impressed by the Creator on the energies of life, could have been gradually prepared in the forms of antecedent living beings. However, the human soul, on which man's humanity definitively depends, cannot emerge from matter, since the soul is of a spiritual nature.") Understanding human origins-evolution as a continuous process is scientifically consistent, but it does not seem neither philosophically nor epistemologically consistent. The lineage of human evolution is a continuous one, but individuals are discrete. A new individual is not defined only by their antecessor and, therefore, there is room for novelty.

Besides, an individual would not be free and not-free at the same time and in the same sense. Furthermore, freedom is a characteristic key to define human beings and to assess the question of original sin as a consequence of a historical fact carried out by humans as a free act of will. If we cannot distinguish one thing from another (for instance, a human being from a non-human being or a free act from a non-free act), we could not even talk consistently. If we deny any kind of categorization, we could hardly do science [19]. Rephrasing Nagel's bat [20], being human is something else than what science and the process of evolution can tell us about human. If we do not distinguish, we could not say that humans have an immortal soul while cells do not have one.

What is at stake is the question of whether talking of human species makes any sense. Epistemologically, we talk of different species so as to comprehend what science does. If we cannot tell apart one thing from another and our language has no connection with reality, science is just a construct that cannot be even useful at all. Nevertheless, as far as science works, we need to claim that there is a connection, even if it is a weak one, between what scientists do, the way they talk, and the reality they talk about — to wit, between language, scientific knowledge, and the known reality [19].

All in all, the former explanation of evolution can be scientifically correct, but it is not complete since it only refers to living beings from the point of view of Natural science, in such a way that it does not answer the questions that Philosophy and religion pose. If the animal psyche and its explanation raise serious difficulties which some try to solve by means of the combination of emergence and complexity, human being as a whole — with, for instance, his freedom and ability to do science — stands out as the central problem for evolutionary theories. Scientists may be able to argue that human body comes from other organisms; however, human being has some characteristics that markedly differ from the rest of living beings.

In studying the similarities and differences between humans and animals in the use of tools [21], the sentiments of compassion [22], and the cultural learning [23-25], there seems to be both a common background and a breach. It has not been until the very last centuries that humans are capable to do science,

but the gap between the outcomes that humans can produce and what animals can do seems so clear [26] that the most plausible hypothesis is that, at some point in the past, something changed, so that now we can do science and act freely while other animals do not; it is a novelty that unleashed humans so as to further develop those abilities that they have in common and are sketched, in fact, in apes.

Let us focus now on some recent scientific data before recalling the questions of their relationships with the original sin as a consequence of a historical fact.

4. Scientific data on human origin

The research methods of paleoanthropologists have been enriched by the contributions from other sciences, such as Genetics, Neuroscience, and even Linguistics. This has fostered a more complete vision of the origin of man and increased the contrast that the hypotheses can reach. Further research must still be conducted to attain stronger conclusions.

In this section, I will attempt to summarize what the most contrasting hypotheses say concerning the following questions: Where can the origin of human beings be located? When and how have they evolved? Is there any room for monogenism? In addition, as a methodological approach, I suggest understanding evolution as analogous to the development of human beings [27], in which biological evolution (hominization) is linked to cultural evolution (humanization).

4.1. A first draft

Taking into account some biological and cultural data, it seems today that the origin of human biological species took place with the appearance of the first *Homo habilis* in sub-Saharan Africa, around the region of the Great Lakes, a few more than two million years ago. The *Australopithecus* and the *Paranthropus* come out of this common origin of the human species, which includes all those who have been labeled with the genus *Homo* [28].

Among the biological characteristics that distinguish *Homo* from its predecessors, we can name the ability to develop some tools, the way of giving birth, and brain development. The interconnection between the latter two could be appreciated, for example, by the fact that in order to have a larger brain and due to the narrowness of the birth canal, *Homo* would have to pass it before his brain could be sufficiently developed. Thus, with less brain development at birth in relation to its final development, *Homo* is helpless and requires a long period of group and postpartum care to survive [29].

Within the species *Homo*, it is possible to distinguish between *Homo habilis*, which was found at the origin of the species, and *Homo ergaster*, which evolved from *H. habilis* and went ‘out of Africa’ for the first time more than a million years ago. (It should be clarified that the term ‘species’ is used here not

in the biological sense but in the paleoanthropological sense. From the point of view of biological species, all are humans.) In this expansion, *H. ergaster*'s evolution gave rise to *Neanderthals* in Eurasia, *Denisovans* in Asia, and *Homo sapiens* in Africa. (In the approach that follows, *Homo habilis* could be considered as *pre-Homo ergaster* and the others as *post-Homo ergaster*. Actually, all could be considered as members of one species, the *Homo* Species. However, it is worthwhile to distinguish between the *Homo* as a whole and the *Homo sapiens* as a part of the *Homo* that currently populates the earth and originates from a variant of *Homo ergaster* through a bottleneck that occurred about 80,000 years ago.)

H. sapiens, which dates back to about 200,000 years ago, led to a latter migration 'out of Africa' in several waves some 100,000 years ago. In its expansion, *H. sapiens* colonized every space again, living and genetically interbreeding with *Neanderthals* and *Denisovans*, which were already occupying Europe and Asia. Over time, *H. sapiens* would be the only subspecies or human population that survived, leading to the variety of races that populate the Earth [30].

Therefore, it could be said that there is a single human species with two lineages and several African outputs. Modern humans populating the Earth are direct descendants of the second lineage (*H. sapiens*), although all of those who came out of Africa some hundred thousand years ago maintain genetic traces (between two and eight percent) from the descendants (*Neanderthals* and *Denisovans*) of the first lineage who left Africa (*H. ergaster*) some million years ago [31]. But, can we be sure that *Homo* in general and *H. sapiens* in particular is the same species?

4.2. Dealing with polygenism

Some researchers suggest that the second lineage was significantly different from the first one, emphasizing the differences that would 'make us humans' [32, 33]. Yet, it does not seem that understanding the expansion of *Homo*'s first lineage as if it were an expansion of hominids, but not humans, can be supported. This way of thinking would stand on the basis of the multiregional model, according to which hominids colonized the world and then human beings showed up in different geographical areas.

Against this polygenetic model of thinking, a more recent sort of polygenism has emerged due to, among others, the genetic research of Li and Durbin. According to the research carried out by these authors, to account for all the genetic variety found in current human population, it would be necessary to have an effective number of several thousands of humans in a historical moment when there would have been a bottleneck in the human population. Also, they argue that it is possible to find a common ancestor of all modern humans on both the paternal and maternal lines. However, these lines do not coincide in time, and the genetic contribution of other individuals to account for the current genetic variety is also required [1, 34]. (The maternal genetic variety is measured

by the mitochondrial DNA and the paternal one by the Y chromosome. Although the study of these variations share the same phylogenetic tree, as the time measure takes place in a short evolutionary period, it may differ in time because it is a statistical measurement of the rate of change. If they coincide, it will be an indication of data manipulation.)

This work, along with others previously conducted, seems to rule out the possible existence of what is called 'Mitochondrial Eve' or 'Y-Chromosome Adam' as common ancestors of all humans. Yet it seems clear that more research is needed to clarify the findings. In order to evaluate and deepen the scope of these investigations, the following points should be considered.

- The reliability of the mathematical model used and the implicit assumptions which are taken into account or are dismissed. The model's outcomes show a bottleneck several tens of thousands of years ago, which fits well with the paleoanthropologic data on the emergence of *H. sapiens* and its expansion. Nonetheless, the model is not able to detect any previous bottlenecks.
- The sample taken to conduct the research (the complete sequence of the human genome in 1,092 individuals) may not be significant enough to make such a long-time inference.

In addition, despite the fact that some genetic data seem to indicate the emergence of a new species not from a common ancestor, but from a larger population, the genetic search for MRCA (Most Recent Common Ancestor) is still considered sound [35].

4.3. Drawing some conclusions

In 2013, a new paper on human evolution described the discovery of five skulls in Dmanisi (Georgia), concluding that the intergroup variation of the human species should be much higher than the estimations made by the narrow classifications of *Homo* subspecies [36-38]. The variation in skull shape and morphology observed in this small sample of five individuals would imply that they all derive from a single population of *H. ergaster*, without the necessity of distinguishing among three different *Homo species* (*H. ergaster*, *H. habilis* and *H. rudolfensis*), such as had been done so far. If all five Dmanisi fossils, very different from one another, belong to a single population of *H. ergaster*, then it could be said that all the *Homo* 'species' classifications are actually variations of a single species. Rather than a 'tree' with branches of different kind of humans, we would find a single species with periods of separation, genetic isolation, as well as moments of mixing and sharing [39].

Therefore, the morphological differences observed between the fossils attributed to *H. sapiens* and the modern *Neanderthals* fall within the observable variation within a single species. Rather than narrow intergroup variations in different species, we should speak of a broad group variation in a single species. Thus, it would not be surprising to find that both *Neanderthals* and *Denisovans* interbred with *H. sapiens* — a tough conclusion to maintain if they should be biologically considered as two different species.

Since 2013, further research has provided new data supporting this idea [40]. However, we cannot say that the human genome has been very uniform for two million years. It is not likely that among all the mutations that have been fixed between us and our closest relatives (chimpanzees and bonobos), only few of them would have taken place during the last two million years. Therefore, we need to find a balance between evolution and continuity within the same species. Recent findings in the Denisova cave in the Altai Mountains (Siberia) revealed that not only has there been gene flow among *Neanderthals* and *Denisovans* with *Sapiens*, but also that there seems to be a fourth source involved in the exchange of genes. This fourth source corresponds to an ancient human lineage that would have separated more than one million years ago, with *H. ergaster* as its most likely source [31].

In other research, some scientists have sequenced the mitochondrial DNA of fossils from the Middle Pleistocene (about 400,000 years ago) from a sample from the *Sima de los Huesos* in Atapuerca, Spain. In doing so, they have discovered that their genetically closest relative would not be among the lineage leading to the appearance of the *Neanderthals*, but of the *Denisovans* some 40,000 years ago in Siberia [41].

While it is true that the conclusions drawn by each one of these investigations could be individually refuted — they do not, therefore, constitute the sole basis for this argument —, so it is that, along with previous research that is not presented in this article, they point out the genetic unity of the *Homo* species for about two million years. Gradually, the concept of evolution as a candlestick structure is being replaced by a network of interwoven genetic lineages that, in the course of time, branch, merge, or disappear again. This should, thus, help remove both the divisions between humans from the first and the second lineages, as if they were different species, and the divisions due to cultural progress. Our biological and cultural evolution is too fluid to restrict it to some stages connected by transitions.

The next challenge is to continue to deepen not only the information provided by Genetics, Neurobiology, and biological-cultural paleoanthropology, but also our comprehensive understanding of them. Further research should be developed both in genetics, so as to clarify the relationship of lineages and the history of human beings and their ancestors, and in the use of new technologies, so as to investigate the old archaeological sites or research points that currently retain a huge potential for new discoveries.

For example, in 2013, the use of new technologies led to the discovery that *Neanderthals* from La Chapelle-aux-Saints in France intentionally buried their dead, while not far away, in El Sidrón, north of Spain, they engaged in cannibalistic behaviour [42]. Here are two very different patterns of behaviour in *Neanderthals*, which, incidentally, have also occurred in more recent times.

Similar cultural differences can be observed among some *H. sapiens* from Southwest Europe who painted on cave walls, while many of his contemporaries did not apparently do this, or, more recently, in the tribal behaviour of the Andaman Islands inhabitants who, according to current genetic data, have

inhabited the island in groups of a few thousand people for about 60,000 years, with little genetic mixing with other people coming in [43]. These discoveries suggest the necessity of taking into account not only biological data, but also the accumulation of knowledge and cultural transmission in assessing the evolution and development of human beings.

5. What culture adds

In this very last section, I would like to give a new twist to what has been presented so far. For this purpose, it would be useful to distinguish between biological and cultural processes that occur in human evolution. The former, that is usually called *hominization*, stands for the formation process of the morphological type of humans or, in other words, the sequence of changes leading to the biological formation of humans as we know them today. The latter is called *humanization* and is the process whereby humans adapt the environment to themselves. In this process, the brain's plasticity, whose evolution receives feedback by environmental pressures and is formed by the newly developed skills, plays a fundamental role.

Among animals, new species or subspecies quickly diversify and adapt themselves to different ecological niches. But among humans, although there is a process of hominization, the process of humanization must have counted more significantly . The difference between hominization and humanization lies in the kind of process that governs the evolution of the humans — the biological process in one case and the cultural one in the other — since the appearance of humans the cultural process tends to predominate over the biological one, although the two processes are both present. At first, the biology would have the primary significance, which would be gradually replaced by culture.

As a consequence, it could be said that the two evolutionary processes would be present in the origin of human beings. The process of hominization is clearly observable in the *Australopithecus*, which tends to a morphological specialization, maintaining a stable cranial capacity; on the other hand, the humanization process is typical of the genus *Homo* and is characterized by a steady increase in cranial capacity with a progressive cerebral specialization. This brain development appeared more than two million years ago and is simultaneously linked to the emergence of cultural forms, such as the manufacture and development of stone tools (*H. habilis*), the use of fire (*H. ergaster*), and the appearance of the first intentional burials (*Neanderthals*). That is to say, there is a simultaneous process of morphological improvement and cultural enrichment [44, 45].

The parallelism between hominization and humanization could be interpreted as an emergentism, according to which humans are a blind result of evolutionary chance and historical flow, both in their somatic aspect (hominization) and in their psychological and cultural aspect (humanization). Or it can also be supposed that the humans begin to go in intelligence and freedom at a certain time and afterwards the process of morphological transformation is

guided not only by genetics but also by a psychic entity. In this second case, the progressive somatic adaptation produced by mutations would be selected if a new morphology permits a better expression of its spiritual being or psychic entity [46].

According to this second view, *H. habilis* could already be human, although with less developed capacities, analogous to the first stages of growth in every human being. The process of human specialization would come after their humanization: the first thing would be the existence of human beings and then they would specialize themselves by selecting morphological and functional random changes more adequate to their being. Thus, the most favorable morphological changes established in a population to exercise rationality would be selected because they provide an adaptive advantage [47].

On the other hand, it seems evident that human beings need a stimulating cultural environment to develop their brains; it is not just a matter of what human beings are, but also of what they are becoming [48]. Let us consider, for example, what would happen if we eradicate all traces of human beings on earth, in a way that only a couple or a small group of children survive. In this context, they would survive with no other cultural exchange but the one they obtain from animals and the one they could provide to one another. In the absence of a cultural environment, though they would be fully human, they could not completely develop their intelligence and it could even be assumed that some of their higher faculties and their correlations in the brain would waste away, since they would put all their effort for the sake of their own survival.

In this hypothetical case, what kind of culture would be transmitted to the descendants? Very little culture would be handed on from one generation to another; being so, in the beginning, the process of acculturation should have been very slow since, even if humans were free and self-aware, they would have to learn everything from scratch and there would only be small groups that convey knowledge from one another. Furthermore, the lengthiness of the acculturation process would have been caused by the fact that most of their resources would be employed to survive and their intelligence would not be as high as ours.

Only with the passing of time, the best adaptation of what is truly human involves a morphological de-specialization. The dominance of the spirit and the ability to use tools free humans from the environment, in a way that they do not need to adapt themselves morphologically they adapt themselves culturally. Animals change in order to adapt themselves to the environment, but humans adapt the environment to their needs. The morphological destiny of humans is linked to their rationality; since they are able to modify the environment, they are no longer immersed in their biology: they gradually escape from the processes of natural selection [46].

6. Conclusions

All in all, the claims made in this paper can be summarized in the following statements.

1. The first sin, which induced the state of original sin, is understood as both a free act of will and a historical fact that took place at some point in the past, even though we cannot argue whether the sin of the origins was accomplished by the first human or it was a personal (or collective) act.
2. The origin of human species could have occurred some two million years ago because H. Sapiens interbred with Neanderthals and Denisovans. If these groups of humans belong to the same species, an earlier date should be assigned to the origin of humans, maybe including H. ergaster and H. habilis as part of the same continuous process of evolution. Hence, the concepts of 'Mitochondrial Eve' and 'Y-Chromosome Adam' as the most common ancestors of humans would be misleading.
3. Monophyletism of the human species (a common origin around a group) seems to be the only valid hypothesis to understand human origins. But, even if the boundaries between humans and hominids are scientifically blurred, in the case of human beings, there has to be a novelty for philosophical and theological reasons: the existence of freedom and immortal soul.
4. Since the appearance of the first humans, a new process of humanization started. It is a process that includes significant changes in human brains, human bodies, human social bonding as well as human culture and contributes to shape the biological process of evolution.

Now, with these conclusions, what answer can we give to the initial question? If the existence of evil were necessarily associated to the sin committed by the first human beings, could science assert that there was no first couple and, therefore, put into question the Christian teaching about sin?

The answer is 'yes' and 'no.' 'Yes,' as far as Science is unable to identify the existence of the first human persons, and 'no,' as far as it is unfeasible to rule out that possibility. From the point of view of science, the boundaries between species are blurred, but from the philosophical and theological points of view, there had to be a first human person — a person who, for the very first time in the history, acted freely, was able to sin, and had an immortal soul. However, in Christian Tradition, monogenism is not a dogma.

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