
The Origin of Man in the Light of Three Fields of Knowledge: Science, Philosophy and Theology*

El origen del hombre a la luz de los tres grados del saber: ciencia, filosofía y teología

RECIBIDO: 14 DE AGOSTO DE 2020 / ACEPTADO: 4 DE NOVIEMBRE DE 2020

Ángel SÁNCHEZ-PALENCIA MARTÍ

Universidad Francisco de Vitoria. Instituto de Investigaciones Económicas y Sociales
Pozuelo de Alarcón (Madrid). España
ID ORCID 0000-0002-9123-1976
a.s.palencia@ufv.es

Rafael JORDANA BUTTICAZ

Universidad Francisco de Vitoria. Instituto de Investigaciones Económicas y Sociales
Pozuelo de Alarcón (Madrid). España
ID ORCID 0000-0001-9088-787X
rjordana@unav.es

Abstract: The reception and development of Darwin's ideas have displaced mankind from the central place in the Cosmos, becoming no more than another evolved animal. This work offers a critical-scientific critique of the dominant ideas in the field of scientific research and debate into the origins of Man. By means of an interdisciplinary analysis (science, philosophy, and theology) of the scientifically proven facts, it is concluded that specimens classified in the genus *Homo* constitute a single species whose morphological evolution (*hominization*) is posterior to its *humanization*.

Keywords: *Hominization, Humanization, Morpho-species.*

Resumen: La recepción de las ideas de Darwin ha desplazado al hombre del puesto señero en el cosmos, para considerarlo como un animal evolucionado, y nada más. El presente trabajo ofrece una crítica científica de las ideas dominantes en el ámbito de la investigación científica y del debate acerca del origen del hombre. A través de un análisis interdisciplinar (ciencia, filosofía y teología) de la facticidad científica se concluye que los fósiles identificados como del género *Homo* constituyen una única especie cuya evolución morfológica (*hominización*) es posterior a su *humanización*.

Palabras clave: *Hominización, Humanización, Morfo especies.*

* This paper is the result of the research projects conducted by the authors in the 2019 and 2020 calls of the Instituto de Investigaciones Económicas y Sociales (IIES) *Francisco de Vitoria*: «*De la humanización a la hominización: planteamiento interdisciplinar de la cuestión*» (2019) and «*El origen del hombre, estado actual de la investigación científica e implicaciones metacientíficas*» (2020).
Versión electrónica disponible en español.

1. BIOLOGICAL EVOLUTION

Biological evolution, or the evolution of species, is the thesis that affirms that over the course of millions of years on Planet Earth there has been a succession of living beings. The species which currently inhabit the biosphere have their origin in their descendants from a progeny of other previous species stretching back to a hypothetical, first living being, referred to as LUCA (*Last Universal Common Ancestor*). The evolutionist thesis rests on facts that can be deduced logically through observation of the natural world. That is, there is a variation on the phenotypic characters in offspring tend towards a better adaptation to a specific ecological environment. However, just as this process leads to the survival of the best adapted, leading to variations which distinguish a species from its ancestors over time, ultimately resulting in a new species; it also leads to the disappearance of species adapted to a specific environmental niche when alterations or disappearance of this niche occur due to geoclimatic, environmental changes, or competition from other species. Strictly speaking, one can affirm that evolution is not a theory but an incontestable fact. Another matter is the explanation of this fact; that is, the processes by which this fact has been verified. It is here where we find diverse theories or hypotheses which attempt to explain the evolution of species.

Firstly, let us look at the facts and the evidence which proves it so: since, naturally, an evolutionary phenomenon taking place over millions of years cannot be reproduced in a laboratory.

The first evidence is found in the fossil register. The term «fossil register» refers to all fossils, discovered and undiscovered, and their location in fossiliferous rock formations and sedimentary beds (strata). Fossils (from the Latin: *fossilis*, derived from the verb *fodere*, to dig) are the preserved remains or traces of organisms (animals, plants, or other organisms) that lived in earlier periods and are now embedded within sedimentary rock. The word fossil is applied to the more or less petrified organic material due to natural causes found within the layers of the earth. The process of transformation of organic matter of the *biosphere* into the *lithosphere*, preserving morphological and even biochemical characteristics, is referred to as *taphonomy* (from the Greek: *taphos*, burial, and *nomos*, law), a term coined by Efremov¹.

¹ EFREMOV, I. A., «Taphonomy: a new branch of palaeontology», *Pan American Geologist* 74 (1940) 81-93.

The taphonomy studies the processes undergone by an organism from the moment of death until its discovery. We can distinguish between body fossils (the remains of the body of a dead organism, usually in fragments); trace fossils or ichnofossils (traces, signs or products, such as feces, called *coprolites*: from the Greek: *kopros*, excrement and, *lithos*, stone); chemical fossils or biological markers (detectable biochemical signatures or traces); resin fossils (amber); subfossils (organics remains that are not entirely fossilized, preserved for millennia) or living fossils, primitive organisms that exist today.

It is important to note that fossilization, is the exception to the rule of decomposition of organic matter, which, in the beautiful words of William Shakespeare, is transformed after death: «*Imperious Caesar, dead and turn'd to clay, might stop a hole to keep the wind away. O, that that earth which kept the world in awe should patch a wall t'expel the winter's flaw*» (*Hamlet*, V, i). Thus, the fossil register is fragmentary, irregular, discontinuous, and random; which relativizes enormously the always provisional conclusions on phylogenetic relations dealt within paleontology. However, the fossil register shows how over the course of distinct geological periods one can trace the history of living being on the planet Earth; how there is a gradual progression from simple to complex organisms. Hence, we discover unicellular organisms from some 3,500 million years ago (hereinafter My); chordates some 570 My; fish some 520 My; amphibians some 380 My; reptiles some 300 My, mammals some 225 My; primates some 66 My, and remains of the genus *Homo* since over 3 My. Ample evidence of the evolution of species.

The study of the geographical distribution of species also shows evidence of the fact of evolution; thus, for example, across the large biographical regions of the Earth, separated by the natural barriers of oceans, mountain ranges, or deserts, we find that species are different by Family, or even Order, while in smaller areas of these regions specific differences are on the level of Genus or Species.

Another striking evidence of adaptation can be observed in comparing placental mammals and marsupials in Australia².

The comparative anatomic-physiological studies show diverse adaptation of organs to different functions. Thus, for example, the quiridium (on upper

² SIMPSON, G. C. & BECK, W. S., *Life: An Introduction to Biology*, 2^a ed., New York: Harcourt Brade & World, 1965.

and lower limbs) show different adaptations for running in horses, flight in birds, swimming in cetaceans, or manipulation in Man.

As Darwin observed, the taxonomic grouping of species represents a degree of kinship, increasingly distant in relation to the first hypothetical form of life mentioned above, which we call LUCA.

Since the days of Darwin and Wallace, genetics and molecular biology have also discovered additional evidence of the fact of evolution. The universality of the system of transcription of the genetic code of all living species necessarily points to a common origin, implying that all life on planet Earth had a single point of origin.

2. THEORIES AND HYPOTHESES EXPLAINING EVOLUTION

Ultimately, a rigorous analysis of the question of evolution in general and the origin of Man in particular, requires a distinction between the facts and their explanation. It is precisely here, in the explanation of the fact of evolution, which diverse hypotheses and theories arise. Among these, the most commonly known is Neo-Darwinism.

The theory proposed by Darwin, based on the evidence set out above, can be synthesised in an expression by Darwin himself: *descend with modification*; that is, that descendants show morphological or physiological variations which make it distinct from its progenitors and with the ability to adapt to a new environment. This takes place over many generations and over a great length of time. Darwin took this notion of temporal extending from the book of the geologist Lyell³, where he maintains that the Earth must be at least 300 My old, according to the principles of uniformitarianism, the notion that the shape and topography of the continents were formed slowly over extended periods of time, due to the same physical and climatic forces, meteorological erosion, volcanism, the actions of rivers and glaciers, etc., acting as is doing today.

The theory put forward by Darwin has been adapted to new knowledge derived from the rediscovery of Mendelian inheritance, particularly related to the concept of mutation: the substitution or insertion of chromosomal alterations, such as polyploidy, the chromosomes fusion or some of its parts, trans-

³ LYELL, C., *Principles of Geology*, London: John Murray, 1830, 346.

location or inversion, etc. The development of genetics resulted in the so-called Synthetic Theory based on the work of Dobzhansky⁴ with contributions from Mayr⁵ and Simpson⁶.

The Neutral theory⁷ was another challenge to the gradualist view of evolution. A large number of mutant genes are generally deleterious but on many occasions they are neutral, that is, they do not offer any selective advantage or disadvantage. Thus, according to Kimura, evolutionary changes are due to genetic drift. Among the conclusions drawn from the Neutral theory are that polymorphism is considered a phase of molecular evolution. From Kimura's theory, what remains is the notion of the *biological clock*.

In 1972, an alternative theory was put forward, the theory of Punctuated Equilibrium⁸. The principal thesis is that the fossil register shows long term stability in species, lasting hundreds of thousands or even millions of years within the same stratigraphic column, interrupted by brusque changes in a short period of time, understood of course in geological terms. In principle, saltationism may appear incompatible with gradualism, but they can be reconciled partly because the punctuation periods can extend for hundreds of years. It also appears compatible with a certain macro-mutationism, with the discovery of regulating genes that control other, structural genes. This is compatible with rapid changes, for example, in the set of genes that regulate growth in certain regions of the body, known as *Hox* genes; in this, and other cases, we find significant mutationism.

In addition to the theories outlined above, there is a great deal of modern knowledge: the adaptability and plasticity shown by comparative physiology, microevolution seen in the experimental evolution of bacteria, the genetic code, biological development, epigenetics, duplications and genes transposition of, chromosomal mutations, etc.⁹

⁴ DOBZHANSKY, T., *Genetics and the Origin of Species*, 3^a ed., New York: Columbia University Press, 1951, 364.

⁵ MAYR, E., «Change of genetic environment and evolution», in HUXLEY, J., HARDY, A. C. & FORD, E. (eds.), *Evolution as a Process*, London: Allen & Unwin, 1954, 157-180.

⁶ SIMPSON, G. G., *Tempo and Mode in Evolution*, New York: Columbia University Press, 1944, 237.

⁷ KIMURA, M., *The Neutral Theory of Molecular Evolution*, Cambridge: Cambridge University Press, 1983, 367.

⁸ ELDRIDGE, N. & GOULD, S. J., «Punctuated equilibria: an alternative to phyletic gradualism», in SCHOPF, T. J. M. (ed.), *Models of Paleobiology*, San Francisco: Freeman Cooper, 1972, 82-115.

⁹ JORDANA, R., *La Ciencia en el Horizonte de una Razón ampliada*, Madrid: Unión Editorial, 2016, 185.

Goldschmidt believed that micro-mutationism within synthetic theory could not sufficiently explain important changes found in the biological world, such as, for example, differences in organizational types (*Phylum*)¹⁰. Goldschmidt's thesis was roundly rejected by Neo-Darwinists. But recently, with new discoveries in developmental genetics, the theory has been partly revived and put into its proper place; that is, there are no «promising monsters» (sudden and important changes creating new forms of life or species which are completely different from their progenitors) as Goldschmidt thought, but there may be mutational changes during the development of certain Loci which can produce profound transformations in embryonic development. In the words of Theisen:

The concept of hopeful monsters would have remained dead as a Dodo if any orthodox evolutionary theory could fully explain the origin and diversification of life as we know it. But there is no such comprehensive theory, and in their attempt to fill the gaps of existing ones, not only has evo-devo developed, but hopeful monsters have also been considered several times¹¹.

With the discovery of *Hox* genes¹², which regulate the anteroposterior development of the *Drosophila* embryo, the vinegar fly, thirty years later it is well known that *Hox* genes are found in all metazoans. These homeotic genes are present in current organisms since they are fundamental for the development of a wide range of organisms.

A particularly clarifying work on this subject was published by Martin et al.¹³ in which they provide a temporal overview of the possible endosymbiotic origin of cell organelles of eukaryotes, such as mitochondria and chloroplasts. The hypothesis originates with Mereschkowsky¹⁴, but the genealogical tree

¹⁰ GOLDSCHMIDT, R., *The Material Basis of Evolution*, New Haven: Yale University Press, 1940, 436.

¹¹ THEISEN, G., «The proper place of hopeful monsters in evolutionary biology», *Theory in Biosciences* 124 (2006) 349-369.

¹² MEGINNIS, W. et al., «A homologous protein-coding sequence in *Drosophila* homeotic genes and its conservation in other metazoans», *Cell* 37 (1984) 403-408.

¹³ MARTIN, W. et al., «An Overview of Endosymbiotic Models for the Origins of Eukaryotes. Their ATP-Producing Organelles (Mitochondria and Hydrogenosomes), and their Heterotrophic Lifestyle», *Biological Chemistry* 382 (11) (2001) 1521-1539.

¹⁴ MERESCHKOWSKY, C., «Theorie der zwei Plasmaarten als Grundlage der Symbiogenese, einer neuen Lehre von der Entstehung der Organismen», *Biologisches Zentralblatt* 30 (1910) 278-363.

presented does not appear to coincide with genealogical tree bifurcations in the theory of descend with modification; that is, it did not agree with what could be called the dominant theory of Darwinism and thus was rejected by the scientific community.

Margulis (L. Sagan)¹⁵ would later revive the theory. This and subsequent theories offer many different systems to explain endosymbiosis. It is not easy to explain. One must bear in mind, as affirmed by Martin et al.¹⁶, that all eukaryotes obtain adenosine triphosphate (ATP) either through fermentation or respiration, with or without oxygen, as the final acceptor of electrons in mitochondria. It is probable that, given the enormous variety of systems producing ATP in the world of Bacteria and Archaea, as well as photosynthesis and the great variety found in prokaryotes compared to eukaryotes, that these were acquired through endosymbiosis, given that the study of respiratory enzymes in eukaryotes indicate a common inheritance. It remains unknown how this occurred.

Horizontal Gene Transfer (HGT) refers to the possibility of transferring genes from one species to another. This is called horizontal as opposed to vertical transfer, which is reserved for sexual reproduction. It was first described by Freeman in 1951 on the virulent activation of *Corynebacterium diphtheriae* by a phage¹⁷. A review by Boto¹⁸ shows that this gene transfer occurs between bacteria, fungi, and plants as a source of genes that have been transferred to metazoans such as sponges, coelenterates, rotifers, nematodes, insects, mites, crustaceans, urochordates, and vertebrates. In some cases, this gene transfer can result in moving elements within the genome called transposons. Especially striking is the case of some genes acquired by nematodes involved in the adaptation to parasitism in plants. In the cited review, Boto compared the proteomes of *Meloidogyne hapla* and *Meloidogyne incognita* with 14 metazoan genomes showing that at least 3.34% of genes which code proteins in the genomes of these nematodes,

¹⁵ SAGAN, L., «On the origin of mitosing cells», *Journal of Theoretical Biology* 14 (1967) 225-274.

¹⁶ Cfr. MARTIN, W. et al., *op. cit.*

¹⁷ FREEMANN, V. J., «Studies on the virulence of bacteriophage-infected strains of *Corynebacterium diphtheriae*», *Journal of Bacteriology* 61 (6) (1951) 675-688.

¹⁸ BOTO, L., «Horizontal gene transfer in the acquisition of novel traits by metazoans», *Proceedings of the Royal Society B*, 281 (2014) 2013.2450, 1-8.

plant root parasites, have a non-metazoan origin. Additionally, they principally code proteins related to the adaptation to parasitic life. Such studies suggest that the acquisition of this form of life in nematodes is due to horizontal gene transfer.

In 1950, Mc Clintock¹⁹ discovered in sequences of DNA in corn which could change position in the genome. These genes were called transferable elements of the genome or transpositions. There are many different types and have a range of effects, can be duplicated, copied and pasted elsewhere in the genome, etc. They may have no apparent effect or can cause mutations by silencing the particular gene in which it is inserted or activate a silent gene. Approximately 45% of the human genome is composed of these transposons²⁰.

Of particular interest is the work of Britten²¹ in studying the set of insertions of transferable elements which have greatly affected human evolution. In the introduction, explains the aim of his work: an explanation for the high speed of evolution of the human lineage, which is exceptional compared to that of other animals. In his work, he conducted a careful study of TEs (*Transposable elements*) found in chimpanzees and humans. It was observed that humans have much more. Only studying the *AluY* families, there are 5,530 new *Alu* TEs in humans and 1,642 new *Alu* in chimpanzees over a period of 6 My. Britten states there is a 1.2% difference in DNA sequences between chimpanzees and humans, over an assumed period of 6 million years. This figure is approximate since it is currently unknown when the chimpanzee separated from humans since there are no fossils of chimpanzee and thus the timing of the molecular biological clock is unknown and may differ from one another.

The evolution of humans is exceptional among all the millions of animals. The lineage leading the evolution of humans must have branched as our ancestors became able to produce advanced stone tools,

¹⁹ MC CLINTOCK, B., «The origin of behaviour of mutable loci in maize», *Proceedings of The National Academy of the United States of America* 36 (6) (1950) 344-355.

²⁰ LANDER, E. S. et al., «Initial sequencing and analysis of the human genome», *Nature* 409 (2007) 860-921.

²¹ BRITTEN, R. J., «Transposable elements insertions have strongly affected human evolution», *Proceedings of The National Academy of Sciences of The United States of America* 107 (46) (2010) 19945-19948.

then continued to advance through language to modern society. It is hard to give a precise date when the lineage leading to humans first advanced beyond what any other animal has ever achieved, but it probably happened about the time the growth in brain size really got underway. It is a fair guess that it was about the time of *Homo habilis* 1.2-2 My²².

In this text, the author ascribes the speed of the growth of the human brain to the increased mutations or recombination of TEs of the *AluY* family, since the human genome has 1.8 million residues of recognizable *Alu* sequences, inserted over the course of 10 million years of evolution of primates. In his conclusions, Britten affirms that TE insertions occurred frequently during the evolution of the human lineage and that these insertions became greater during the last 3-4 million years, inviting speculation that the insertions of *Alu* underly the rapid evolution of the human species. If we add the chromosomal differences referred to between Man and other related primates, we find enormously significant differences. We are quite separate from the chimpanzee, both due to chromosomal mutations and micro-mutations, or TEs, which have made our development vastly different.

Finally, among other explanatory theories of evolution, epigenetics deserves mention. Epigenetic inheritance refers to the transmission of characters that do not depend on DNA for mitosis or meiosis. Epigenetic activity modulates gene expression without being related to DNA modifications. These changes are sometimes caused by DNA methylation through cytosine regulating gene expression. Histone modification may be produced by acetylation, methylation, or phosphorylation, which may alter the expression of the gene. Holliday²³ was the first to use this term in the sense given here. The role of epigenetics in evolution or other aspects of the life of organisms, such as cancer, is as yet unknown.

²² Cfr. BRITTEN, R. J., *op. cit.*, 19946.

²³ HOLLIDAY, R., «DNA Methylation and Epigenetic Inheritance», *Philosophical Transactions of the Royal Society of London Series B. Biological Sciences* 326 (1235) (1990) 329-338.

3. EPISTEMOLOGICAL SCOPE OF THE QUESTION OF THE ORIGIN
AND THE INTERDISCIPLINARY APPROACH

The primary material object of this work is Man and, secondarily, his origin. It is necessary therefore to clarify well the relationship between the different sciences which relate to the origins of mankind: paleoanthropological disciplines, philosophical anthropology, which includes natural philosophy and metaphysics, and theology; these entire disciplines share the same object.

This is necessary for gnoseological reasons since it is in the unity of knowledge that the unity of the entity itself is found; for historical-cultural reasons, given that this intellectual unity, broken centuries ago, is the cause of the fragmentation of knowledge, which we may refer to as the *ontologization* of the empirical sciences, as demonstrated by the dissemination of scientific literature dealing with evolution in general and human evolution in particular.

It is, therefore, necessary to delimit, distinguish and sort the various spheres of knowledge to perform a synthesis; to give an «unified and organic vision of knowledge. This is one of the tasks which Christian thought will have to take up through the next millennium of the Christian era»²⁴.

In this regard, the work of Jacques Maritain, *Distinguer pour unir ou les degrés du savoir*; *Distinguish to unite or the degrees of knowledge* is classical and definitive. Based on a text by Saint Paul in the Epistle to the Ephesians²⁵, Maritain explains the four dimensions of human knowledge: *width*, *depth*, *length*, and *height*²⁶. The various kinds of knowledge (science, philosophy,

²⁴ SAINT JOHN PAUL II, Enc. *Fides et ratio* (September, 1988), 85.

²⁵ «That Christ may dwell in your hearts through faith; that you, being rooted and grounded in love, may be able to comprehend with all the saints what *is* the width and length and depth and height, to know the love of Christ which passes knowledge» (Ef 3:17-19).

²⁶ «Du point de vie noétique où nous sommes placés, disons que la longueur symbolise pour nous la façon dont la lumière formelle qui caractérise un type de savoir tombe sur les choses et détermine en elles une certaine ligne d'intelligibilité, à la largeur correspond la quantité sans cesse croissante des objets ainsi connus, à la hauteur, la différence de niveau créé entre les diverses sortes de savoir par le degré d'intelligibilité et d'immatérialité de l'objet, d'où suit, pour chacune, une manière de procéder originale et typique, quant à la quatrième ces diversités plus cachées qui dépendent de la manière dont l'esprit, dans sa liberté, diversifie encore d'après ses finalités propres ses objets et ses manières de se conformer au réel. La différence entre la philosophie spéculative et la philosophie pratique est l'exemple le plus simple de telles diversités mai ce n'est pas le seul». MARITAIN, J., *Distinguer pour unir ou les degrés du savoir*, in *Œuvres Complètes de Jacques et Raïssa Maritain*, IV, Fribourg: Éditions Universitaires de Fribourg, 1983, 260-261.

and theology) define certain lines of intelligibility of the object of knowledge. Its formal object limits and helps to know in part the material object. Thus, concerning the object of study at issue here, mankind and its origin, particular anthropologies (human biology and paleo-anthropology) provide a degree of self-knowledge that helps us to understand, in part, the reality of the object of study; but its formal light cannot illuminate other areas illuminated by other kinds of knowledge, such as philosophy and theology. In Maritainian terms, the *length* is illuminated by the three degrees of knowledge each of which illuminates a part that is not illuminated by the others.

We said that the object of study is Man and his origin, which implies, first of all, knowing that which we are tracing from its origins on planet Earth. In the dimension of knowledge that symbolizes *height*, we consider, first of all, the current state of paleoanthropological research, updated in the present work. The science that deals with the usual life forms is paleontology. The term paleontology, etymologically, is composed of three Greek roots: *palaios*, ancient; *ontos*, being, and *logos*, treated; and designates the science that studies living beings in past times taking as a direct source fossil remains. As indicated above, the fossil record is fragmentary, irregular, discontinuous, and random. Paleontology is not limited to a description of these remains but extends its study to structural and morphological analysis and, in general, of all available data that can contribute to reconstructing in the most complete way possible the living being to which they belonged. It also studies the type of life, environmental conditions, changes experienced during the course of geological becoming, etc. and the degree of kinship between one living being and the other; that is, the phylogenetic relationships that seek to reconstruct the temporal development of living organisms. For its part, paleoanthropology delimits the material object of paleontology, by circumscribing it to our ancestors.

But the empirical sciences that study the origin of Man do not themselves reach into human *nature*, but merely assume it, its analysis, delimited by its method, illuminates partial aspects of the material object, in this case, man, and point therefore towards broader explanatory sciences such as philosophical anthropology. Secondly, let us consider philosophical disciplines, especially philosophical anthropology. The Philosophy of Man studies man as man, the ultimate structures of man's being in search of a principle that provides sufficient reason for all human phenomena, especially those psychic

and somatic singularities that the human species presents. Although the human being transcends material nature, he is a corporeal being, a living being and, as such, is also the object of study of the philosophy of nature, which studies moving and sensitive bodies, inert and living bodies, the differences that exist between them, etc., which is a material physical discipline, studying the natural rather than the artificial, and formally metaphysical. Finally, in the field of philosophy, we also consider the question of the first reality, the foundation of everything that exists. And at this point is where the bifurcation occurs between the materialistic worldviews that consider that matter is the first reality, from which everything else is derived, and the worldviews that think that the first reality is something more like a mind and everything that on it is based creates a conscious, loved, designed product that tends towards its end.

But when we reach the limits of natural rational knowledge, we do not reach the key that unifies and gives full meaning to the human experience. That is why, thirdly, we consider supra-rational knowledge: theology. Theology is the science of God based on divine supernatural Revelation accepted by theological faith. Theology deals with God as the author of the natural order and as God, that is, according to his intimate life. Theology participates in divine science in such a way that, knowing what God shows us about Himself, it knows from Him the entire created reality; that is to say, dealing mainly with God, it also extends to creatures insofar as they relate to God as their beginning and their end: which means knowing them from their radical foundation. Theological science aims to know and conceptually analyze the truths of faith and deduce from them other knowledge virtually included in the deposit of faith. It is, therefore, a developed knowledge that proceeds through reason guided by faith, whose light is born from infused supernatural faith and natural reason under the guidance of Sacred Tradition, Holy Scripture, and that of the Church Magisterium²⁷. Man, his origin, and his destiny – aspects that are especially relevant for this paper – are part of the secondary material object of theology because of their relationship to God and his plan of salvation. Saint Thomas explains that the sacred doctrine is true science, distinguishing two types of sciences, those that deduce their conclusions from principles evident by the light of natural understanding, such as

²⁷ Cfr. Const. Conc. *Dei Verbum* (18 de noviembre de 1965), 10.

geometry, and those that do so from principles evident by the light of a higher science, such as perspective on geometry; in this way, theology is a science since it draws its conclusions from a higher science that is the revelation of God²⁸.

Thus, we reach the fourth dimension of human knowledge, *depth*, understanding profundity according to Maritain, as the manner in which the spirit conforms to reality according to its own ends, the hinge between poetics and ethics. To this dimension belongs in full right the question about the descent of man, in whose epistemological scope we, therefore, find palaeoanthropology, philosophical anthropology, and theology. Theological Anthropology that studies the human creature when it says relationship to God, delves into the origin, nature, and last purpose of human existence. The purpose of the ultimate meaning of human existence is intrinsically embedded in the question of origin. From the historical-cultural point of view, the broadly accepted anthropologies of today, regard mankind as the last product of the evolution of planet Earth and nothing more; thus constituting one of the most principal sources of agnosticism.

About to scientific knowledge, *width* refers to the continuous paleoanthropological discoveries to be addressed below, concerning the joint consideration of the fossil and archaeological record (Figure 1).

4. THE ORIGIN OF MAN: A NATURALLY CULTURAL BEING

Considering a known text from Plato in *Protagoras* explaining the Promethean myth of the origin of Man²⁹. Beyond philosophy and science, we see in this text how mythical wisdom expresses a fine observation of what we can call the *morphological insufficiency* of mankind in adaptation to the environment of other animal species: «The human race was naked, unshod, unbedded, and unarmed»³⁰. Along with this observation of ancient mythical wisdom, two more ideas stand out; on the one hand, the assertion that the Titan Epimetheus was not entirely wise, which expresses, in poetic words, that Man is, in some way, an error of nature; of another, that this natural error is mended with

²⁸ SAINT THOMAS AQUINAS, *Summa Theologiae*, I, q. 1, a. 2.

²⁹ PLATO, «*Protagoras*», 320c-322.

³⁰ PLATO, *op. cit.*, 321 c.

a divine reality: the mythical Promethean theft, Hephaestus and Athena art, together with fire, to give to Man.

The myth highlights an anthropological insight of enormous relevance; namely, that Man is a naturally cultural being. By culture, according to the personalistic definition of Saint Thomas Aquinas, we understand the sciences and arts to be oriented towards the perfection of mankind, that is, his happiness³¹. Culture and, linked to it, education is such a natural and universal function that it takes a long time to reach the consciousness of those who receive and transmit it. Its thematic content is similar in all peoples and is, at the same time, moral and practical. In referring to the transmission of professional knowledge and skills, by imitation, orally, or by scientific dissemination today, the Greeks used the word *techné*; for the moral ideal of excellence that we find written in epic literature in historical cultures, the Greeks called it *areté*³² or excellence and this excellence should be for them what is best in Man, that already in times of Attic splendor, the Greek called *nous*, an untranslatable term since *nous* encompasses more than what we call «intelligence»; it is also referred to as a capacity for mystical intuition.

5. HUMAN ANATOMICAL AND FUNCTIONAL APOMORPHIES

Among the apomorphies or evolutionary traits that distinguish humans from simians indicated by Carroll³³, a comparative anatomical study of the female pelvis of man and chimpanzee³⁴ shows that the human birth canal is

³¹ SAINT THOMAS AQUINAS, *Commentaries on Aristotle's Metaphysics*, Proemio, 2. See ROVIRA, R., *Bilingual edition of the «Proemio» by Thomas Aquinas in his «Commentaries on Aristotle's Metaphysics» (Unpublished teaching material)*, Department of Theoretical Philosophy, Faculty of Philosophy, Complutense University of Madrid, 2016 in E-Prints Complutense <https://eprints.ucm.es/38962/> (consulted June 22, 2020).

³² Cfr. JAEGER, W., *Paideia*, México: Fondo de Cultura Económica, 1962, 1151.

³³ CARROLL, S. B., «Genetics and the making of *Homo sapiens*», *Nature* 422 (2003) 849-857.

³⁴ This illustration shows the comparative anatomy of the female pelvis of *Pan paniscus* and *Homo sapiens*. Note the narrowness of the birth canal in *Homo sapiens* (at right) compared to *Pan paniscus* (at left).



wider in the transverse than in anteroposterior sense due to bipedalism, shortening the distance from the hip joint to the sacrum. When the neonate enters the half-pelvic plane, wider in the anteroposterior sense, it is rotated 90° to accommodate the birth canal. This implies contradictory anatomical designs because the pelvis not only related to locomotion, but in females, must allow the complete development of the fetus and birth. The way nature has solved this problem is known: still soft cranial bones in the fetus, birth in a very immature state and, different hip anatomy in women and men, with designs that could be considered less forced by bipedal posture in the case of women.

Beyond the problems inherent in childbirth, birth with an immature skull, and therefore an uncompleted brain forces a long period of exo-gestation or secondary altriciality, the stage of growth that takes place outside the maternal uterus, in what we can well call *a cultural uterus*³⁵. This underscores the need to consider alterity, as a specific human trait. Man is thus a dialogical being, incomprehensible and unviable in isolation.

But this cultural uterus which we have known since historical times and archaeologically for millions of years, shows the functional apomorphy that Carroll calls, concerning *Homo sapiens*, «advanced tool building» and which, in less advanced phases, is found in the archeological record millions of years before Man, what paleoanthropology calls *Homo sapiens*, that is, millions of years before current Man. Technical behavior and its specific uniqueness to humans will be further discussed below. Although some animals use natural objects to meet their biological needs and can learn by imitation, the animal kingdom offers no evidence of tool manufacture or the transmission of such skills. While some identify such behavior in animals, this is primarily due to anthropomorphic projection.

To explain such unique human apomorphies and illuminate the question of the origin of Man, it is necessary to distinguish what in human paleontology, is called *hominization* and *humanization*. Hominization is the evolutionary process of morphological formation; that is, the sequence of changes that lead to the biological form of Man as we know it today in all

³⁵ Cfr. ROF, J., *Urdimbre afectiva y enfermedad*, Barcelona: Labor, 1961, 518.

its morphological variety. The term *humanization* refers to cultural manifestations. Hominization and humanization both refer concomitantly to the possibility of such facts. It is here where the paleoanthropological and philosophical epistemological planes necessarily tangents meet. In fact, the explanation referred to above (dimensions of the pelvis and advanced tool building) is always, as we will see below, a meta-scientific explanation.

6. THE FOSSIL REGISTER AND THE ARCHAEOLOGICAL REGISTER: SIMULTANEOUS CONSIDERATIONS (FIGURE 1)

In 1988, Jordana published a chart that schematically summarized the fossils that were then known and their cataloguing at that time. It was already intuited that what were called species in the Linnean sense (generic and specific name) were not distinct species, but rather *paleospecies* or *morphospecies* that did not correspond to the biological definition species³⁶. Returning to the four dimensions of knowledge described by Maritain, the *width* corresponds to the amount of knowledge of a certain line of intelligibility, in this case, paleoanthropology, which is constantly increasing. Thirty-two years after the aforementioned publication, the paleontological, archaeological, and genetic discoveries – the latter unknown at that time –, collected in the present work, have advanced vertiginously so that what in 1988 was presented as a possible intuition is demonstrated as a thesis from paleoanthropological science. Indeed, the bibliography cited here, which exhaustively contemplates the scientific *status quaestionis*, demonstrates the specific unity of the genus *Homo* from *Homo habilis* to modern man. A specific unit that is also corroborated by the philosophical notion of species and coherent with the knowledge of man from theological science.

³⁶ Cfr. JORDANA, R., «El origen del hombre. Estado actual de la investigación paleoantropológica», *Scripta Theologica* XX/1 (1988) 65-98; and JORDANA, R., *La ciencia en el horizonte de una razón ampliada*.

Consider Figure 1 below:

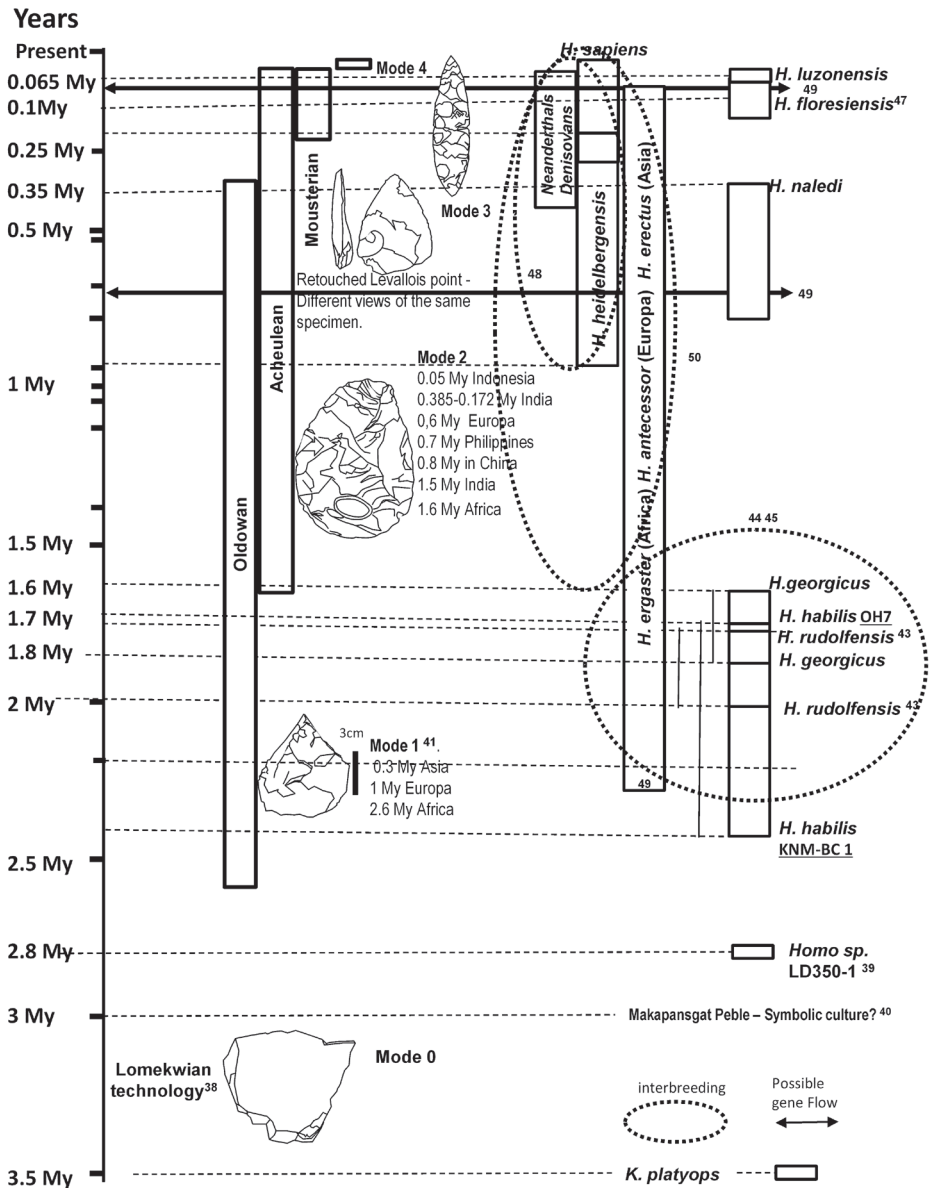


Figure 1. The figure shows the relationship among different paleospecies or morphospecies of *Homo* with the lithic industries (mode technical 0, 1, 2, 3, and 4).

Two-pointed arrows mean possible gene transference.

Ovals mean possible interbreeding, demonstrated in Neanderthals, Denisovans, and *Homo sapiens*; probably between *H. habilis* and *H. erectus*.

The figure above seems crucial to a correct understanding and demonstration of the main thesis that sustains this work. The Linnean name of the species and morphologies of the *Homo* genus (we believe is correct to name the fossils to clarify the subject, but this is very different from accepting them as Linnean species, as happens on many occasions) really constitute a single species, the human species.

On the left of Figure 1 is the non-logarithmic time scale. This is provided because most readers of this article may not be familiar with logarithms and be unable to easily interpret the geological time we are considering. That timeline begins at its base 3.5 million years ago and ends in the present.

On the left side of Figure 1 is the series of lithic instrumentation let by Man throughout history. Of course, it is highly likely that before or at the same time sharp sticks and bone fragments were used that have not fossilized or have gone unnoticed.

At the base of these lithic cultures, we find the Lomekwian culture or Technical Mode 0, which is named after the archaeological site of Lomekwi, near Lake Turkana (Kenya), where it was discovered in 2015³⁷. Lomekwian culture has been attributed to *Kenyanthropus platyops* (Leakey et al., 2001) (3.5 My), a fossil which, while similar to other fossils of the *Homo* genus (*Homo rudolfensis* Alexeev, 1986), is so fragmented that it may be another or *Australopithecus afarensis*, but neither of these species left any cultural remains, and so it may be an indeterminate *Homo sp.* (2.8 My)³⁸ before *Homo habilis* or even an older *Homo habilis* as yet undiscovered. A short time later we find what is perhaps the first sign of symbolic culture, a *manuport*: the Makapansgat pebble³⁹, a natural object that shows the appearance of a human face (eyes, nostrils, mouth) found in a cave about 4 km from the natural place where these types of pebbles are found, which can be assumed to have been transferred to as a symbolic object that was an effigy of the bearer.

³⁷ HARMAND, S. et al., «3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya», *Nature* 521 (7552) (2015) 310-315.

³⁸ VILMOARE, B. et al., «Early Homo at 2.8 My from Ledi-Geraru, Afar, Ethiopia», *Science* 2015, 347 (6228) (2015) 1351-1355.

³⁹ DART, R. A., «The waterworn australopithecine pebble of many faces from Makapansgat», *South African Journal of Science* 70 (1974) 167-169.

Technical Mode 1 (Oldowan), discovered in the 1930s by Richard Leakey⁴⁰ has the peculiarity of its antiquity, approximately 2.6 My, usually referred to in scientific literature to *Homo habilis*. As shown in the graph, it had an extensive duration, until some 0.3 My ago and has therefore been used by other morphological types of *Homo*, indicating communication between them. This culture has been found in the Afar Triangle; and was found in Algeria in 2018⁴¹. However, it shows 1 My in Europe and 1.8 My in Dmanisi and 0.3 My in Asia. This tells us that *Homo habilis* probably left Africa or that *Homo erectus* took its culture and carried it beyond Africa. However, there is some sign of the presence of *Homo habilis* in Dmanisi.

On the right of Figure 1, we see at this same level of antiquity, approximately between 1.5 and 2.5 My a set of fossil denominations such as *Homo habilis* (Leakey, Tobias & Napier, 1964), *Homo rudolfensis*⁴², *Homo georgicus* (Gabounia et al., 2002) – all found in Africa or Europe – and *Homo erectus* (Dubois, 1894). These were contemporaries and so there is the possibility of genetic exchange between them. A paper by Van Arsdale⁴³ shows that these species cannot be differentiated using the complete skulls between 1.5 and 1.8 My from Africa and Dmanisi; this paper, disputed by Tattershall's group, had a significant echo in *Evolution* journal. In short, it appears that the morphological dispersion does not justify the specific differentiation between *Homo habilis* and *Homo erectus*. Similarly, with identical results, Lordkipanidze⁴⁴ presents the morphological variation in the same geological stratum of five fossils, four belonging to *Homo habilis* and one to *Homo erectus*, showing the same morphological dispersion found in the current populations of bonobos. This leads us to the notion that we cannot strictly speak of different species, but rather of different morphologies of the same

⁴⁰ LEAKEY, M., *Olduvai Gorge*, London: Book Club Associates, 1979, 11-17 and 40.

⁴¹ SAHNOUNI, M. et al., «1.9-million and 2.4 million-year-old artifacts and stone tool-cutmarked bones from Ain Boucherit, Algeria», *Science* 362 (2018) 1297-1301.

⁴² LEAKEY, R. E., «Evidence for an advanced Plio-Pleistocene hominid from East Rudolf, Kenya», *Nature* 242 (1973) 447-450. LEAKEY, M. et al., «New fossils from Koobi Fora in northern Kenya confirm taxonomic diversity in early», *Nature* 488 (2012) 201-204.

⁴³ VAN ARSDALE, A. P. & WOLPOFF, M. H., «A Single Lineage in Early Pleistocene *Homo*: Size Variation Continuity in Early Pleistocene *Homo* Crania from East Africa and Georgia», *Evolution* 67 (3) (2012) 841-850.

⁴⁴ LORDKIPANIDZE, D. et al., «A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early Homo», *Science* 342 (6156) (2013) 326-331.

polymorphic species. This is the meaning expressed by the oval drawn around these names in Figure 1. Considering the recent discovery⁴⁵ which delays the presence in South Africa of *Homo erectus* by 200,000 years, it seems possible they were contemporaries of *Homo habilis* and therefore less derived from it.

Returning to Figure 1 and Technical Mode 2 (Achelense), this technique is typical of *Homo erectus*, having duration of between 1.6 to 0.065 My and used by different *Homo* morphologies. The figure shows the presence of Technical Mode 2 in different parts of the world, indicating its departure from Africa and wide dissemination, including *Homo floresiensis*⁴⁶ and *Homo luzonensis* (Detroit et al., 2019). Technical Modes 3 and 4 already belong to the neanderthals and the *H. sapiens*. The oval that encompasses these two species is no longer hypothetical, as is known, ancient DNA, both mitochondrial and nuclear, identifies a relationship over many years between these two species or morphologies, together with the Denisovans⁴⁷, which leaves different proportions of their genome that we find today among Europeans and Asians. We can no longer speak of three species, rather of different morphologies or races in genetic exchange, as proposed in a recent article⁴⁸ on gene transfer. This is represented in the graph by means of cross-sectional double arrows covering the different «species».

Extremely recent has been published a paper that established the connection between the *habilis-erectus* and the *neanderthal-sapiens* complexes, showing the genetic introgression of possible *Homo erectus*' genome in Denisovans, Neanderthals and currently existing humans. This paper supports our conclusions about the study of the fossil and archeological register⁴⁹.

⁴⁵ HERRIES, A. I. R. et al., «Contemporaneity of *Australopithecus*, *Paranthropus*, and early *Homo erectus* in South Africa», *Science* 368 (6486) (2020) aaw7293 2-19.

⁴⁶ ARGUEA, D. et al., «The affinities of *Homo floresiensis* based on phylogenetic analyses of cranial dental and postcranial characters», *Journal of human evolution* 107 (2017) 107-133.

⁴⁷ ROGERS, A. R. et al., «Neanderthal-Denisovan ancestors interbred with a distantly related hominin», *Science Advances* 6 (2020) 8, eaay5483, 1-7.

⁴⁸ GALWAY-WITHAM, G. et al., «Aspects of human physical and behavioural evolution during the last 1 million years», *Journal of Quaternary Science* 34 (6) (2019) 355-378.

⁴⁹ HUBISZ, M., WILLIAMS, A. L. & STEPEL, A., «Mapping gene flow between ancient hominins through demography-aware inference of the ancestral recombination graph», *Plos Genetics* 16(8) (2020) e1008895 1-24.

7. EXPLANATORY HYPOTHESIS

As considered above in dealing with the crucial epistemological question, seeking the truth of Man and his origins requires distinction, but not separation, unity, but not identification between the different degrees of knowledge: science, philosophy, and theology.

The current state of paleoanthropological research indeed raises questions which, while they belong in part to the so-called positive sciences, more or less intersect with truths attained by philosophy and the truths of the Christian faith; so when we take as a starting point the current conclusions of palaeoanthropology it is absolutely essential to distinguish between the facts actually demonstrated and the hypotheses which, even supported by the positive sciences, often encroach or invade the provinces of philosophy and theology.

Pars destruens

The obfuscation of reason by Modernity⁵⁰ that hinders the metaphysical awareness of the real debilitates common sense within our current social dynamics. Most explanatory hypotheses found in scientific debate and mass media, even in scientific and educational literature, respond to what we referred to above as the *ontologization* of science. This is the case when metaphysical suppositions are not explicitly distinguished from scientific statements; science becomes a kind of *philosophia prima*⁵¹ and, given that the scientific method only considers the material aspects of things and phenomena that it studies, in a materialistic ontology, making claims that are in no case legitimately inferred from the science itself and which are often presented as if it were a scientific image of the world and Man. Moreover, given the well-deserved prestige enjoyed by science in contemporary culture and thinking, the purported scientific materialism that regards Man merely as the last product of

⁵⁰ Cfr. JORDANA, R., *La ciencia en el horizonte de una razón ampliada*.

⁵¹ «The concept of “evolution” has transcended its scientific basis, constructing a mental model which presumes to provide an exhaustive explanation of reality, a form of *philosophia prima* (...) a reduction of all reality to evolution: also able to explain credibly knowledge, ethics and religion from the general precepts of evolution». RATZINGER, J. in the introductory note in the publication in 1986 of the minutes of a symposium held in Rome in 1985 on «Evolution and Christianity», from HORN, S. O. & WIENDENHOFFER, S. (eds.), *Creación y evolución*, Badalona: Claret, 2008, 6.

geo-biological evolution, presents a solid validity in the contemporary collective imagination.

The classical explanatory hypothesis of Darwinism and Neo-Darwinism or the hypothesis of humanization in *feed-back* aims to explain the cultural fact of *humanization* through a closed feedback loop according to which bipedalism and the consequent release of the upper limbs of the motor function, made possible the adaptation of the upper quirdia limbs to the manipulation and consequent construction of tools, whose functions (cutting and crushing of food, etc.) replace anatomical forms intended for such purposes (loss of tusks and other maxillofacial adaptations, etc.) allowing the increase of cranial capacity and, consequently, the development of greater brains and, with them, the emergence of a culture that feeds the evolutionary process.

Note that this hypothesis implicitly assumes two more hypotheses: one of an anthropological nature and one of an ontological nature. The first is mind-brain identification; the second is materialism. In addition, this hypothesis, admitting reasonable *feed-back*, presents a considerable problem; namely, that the manufacture of tools implies the presence of intelligence that is the cause and not the consequence of *techné* (lithic industry). Ultimately, this and other similar explanations widely disseminated in scientific literature and, so part of the collective imagination today, argue that rationality and functional apomorphies linked to it are epiphenomena that emerge as a result of the increase in brain mass, that is the *emergentism*.

In its ontological facet, it is a materialism that affirms that matter is the ultimate principle of existence, including the human mind with all its attributes that emerged from material processes. Therefore, it is an emerging materialism.

Thus, beyond the dissemination and social acceptance of such ideas, we are faced with spurious hypotheses both from the epistemological and logical point of view. Indeed, although the materialistic view is an option that merits serious discussion, from an epistemological consideration it is a materialistic reading of science, a deformed representation of science which attempts to present as scientific fact what is but a particular interpretation; in short, it is an ontologization of science. From a logical consideration, on the one hand, we are faced with a fallacy of begging the question, in which the conclusion intended to be demonstrated (materialistic monism) is implicitly included in

the premise; that is, reducing the mind to the brain, a confusion between cause and material condition. The mistake is coarse but very old, beautifully described in Plato's *Phaedo*:

Imagine not being able to distinguish the real cause from that without which the cause would not be able to act as a cause. It is what the majority appear to do, like people groping in the dark; they call it a cause, thus giving a name that does not belong to it⁵².

Pars construens

To interpret rigorously the facts demonstrated by palaeoanthropology require reading them in the light of philosophical and theological knowledge to overcome the reductionist and/or ideological interpretations of a scientific nature analyzed above.

The meta-paleographic consideration of the archeological record requires an analysis of the technical behavior that unequivocally shows the lithic industry is a true culture, however primitive. This lithic industry constitutes the only cultural factuality available from the most remote times of humanity. In a first approximation, we can say that entails imagining an unnatural object whose implementation requires the competition of at least four elements; namely an anvil, the material piece undergoing transformation, a burin, and a hammer, from which we can infer that its author is an intelligent being, as in the case of *Homo habilis*. Scientific literature is often ambiguous in distinguishing between the technical and the instrumental, and so it is necessary to determine what constitutes technical conduct, its essential characteristics, and the implicit and necessary gnoseological suppositions to explain such behavior. Certainly, instrumental behavior is found in the animal world, but is fundamentally different from technical behavior which consists in the manufacture of tools; that is, the transformation of a certain material, suitable in its properties, according to an exemplary idea conceived in the mind, ordered to a certain purpose. As rough as the lithic industry may seem in itself, it implies a conceptual knowledge typical of human intelligence, behavior which is qualitatively different from animal behavior.

⁵² PLATO, *Phaedo*, 99b.

Indeed, the difference between Man and animal is shown and encrypted in the most genuine and unique operation of human knowledge. Human knowledge is a unit composed of two dimensions: sensitive and intellectual, which must be distinguished but not separated. The sensitive element comes from external receptors (touch, sight, hearing, smell, taste) through the sensitive organs (skin, eye, ear, nose, tongue) thanks to the impact of external physical, chemical, or mechanical forces. (stimuli) and internal sensory faculties that sensibly present objects in a unitary and structured space-time form. The intellectual dimension, for its part, has its most genuine operation in the capacity for abstraction from which it makes judgments and reasoning. To abstract (*abs-trahere*) means to separate: the process by which the understanding separates the essence of the thing, which makes a thing what it is. Abstraction is the process by which one passes from the sensible, individual, and concrete to the intelligible; that is, from the particular things of reality to the universal concepts of the mind. Thanks to the intellectual faculty, a man not only knows this or that particular stone but also the idea of the stone itself, which does not depend on the space-time conditions of this or that stone. This idea dispenses with the specific characters (color, shape, size, hardness, etc.) of this singular stone and applies to all (universal) stones. To properly understand the technical behavior, that is, the manufacture of lithic tools that, as we have seen in Figure 1, we find in the archaeological record at a very early time, it is very important to note that the act of the intellectual dimension of knowledge Being Human is intrinsically (in itself) independent of matter, although extrinsically dependent on the sensible level of knowledge (material). It is necessary, therefore, to explain this phenomenon that qualitatively separates the intelligent or non-intelligent by their causes according to the principle of sufficient reason. Such conceptual knowledge is an essential requirement in the genesis and manufacturing process of any artefact, both in the choice of material and in the ideal anticipation of the result; the idea that guides the transformative process. This specific singularity not only denotes a more complex living being but emanates from what we call *human nature*.

Human knowledge, as with other psychic aspects and singularities of the human species, which we will not address here, such as free will, self-awareness, intersubjectivity, etc., which can be encompassed under the term *consciousness*, as we have said and we know since Aristotle, is intrinsically independent of the mater:

We have no evidence as yet about mind or the power to think; it seems to be a widely different kind of soul, differing as what is eternal from what is perishable⁵³.

Naturally, as with the classic principle *agere sequitur esse*, «action follows being», the previous reasoning about human knowledge, technical conduct and its causes leads us to the central question of all philosophical anthropology: the ontological structure of the human person. Although there are numerous anthropological theories within the history of Anthropology, with many nuances, ultimately the available anthropological dogma is reduced to three interpretations: monism, which reduces everything to pure matter or pure spirit; dualism, which separates the spiritual and the material; and the dual or synthetic vision of spirit and matter as a single whole at once constitutive and dynamic⁵⁴.

The dialogue between biological and paleoanthropological sciences with other meta-scientific knowledge requires a philosophical, conceptual framework for the full interpretation of the anatomy-morpho-physiological structure and its relationship to human action. Experience of interdisciplinary, academic collaboration underscores the adequacy of the Aristotelian-Thomist tradition to establish and develop this dialogue, for two fundamental reasons. From the epistemological point of view, given the relevance that Aristotle and Saint Thomas ascribe to Somatology; and from an ontological point of view, because of the unitary concept of substance (hylomorphism) that explains the bio-psychic unity of the living, integrating fruitful ideas of contemporary German anthropologies, according to which Man is a being in whose *soma*, not only his *psyché* reveal the presence of rationality or spirit⁵⁵.

Indeed, hylomorphism maintains that mankind is not a juxtaposition of two substances, as in Platonism and Cartesian philosophy, but a substantial and specific unity of two constituent principles, material and formal, communicating to the whole the act of being and the specific act. For Saint Thomas, the human body can only be understood considering what makes it human, that is, the soul, since corporeity is constituted by form. The soul

⁵³ ARISTOTLE, *De Anima*, 2, 2, 413b.

⁵⁴ Cfr. SANGUINETI, J. J., *Filosofía de la mente. Un enfoque ontológico y antropológico*, Madrid: Palabra, 2007, 368.

⁵⁵ Cfr. PRIETO, L., «Historia de la idea antropobiológica», *Naturaleza y Libertad* 10 (2018) 253-287.

informs, organizes, and moves the body, but not without the body that also moves the soul. Here we find the secret of the human body, in which the adjective *human* is key, that is, the body is a revelation of the dignity and nobility of the human person in its morphological singularity as *morphological insufficiency*, and those human apomorphies (Carroll) that we considered above: bipedalism and its anatomical consequences, and advanced tool making. Thus, the rational animal, using the essential organ of the hands, freed by bipedalism from motor functions and adapted to manipulation, reveals the human body as a matter of the rational soul and the instrument of actions particular to Man: knowledge, technical skill, and love in freedom. At the same time, the human body manifests its extraordinary beauty precisely in its morphological insufficiency, the material correlation of the *anima que est quodammodo omnia*, «the human soul, being spiritual is, in a certain way, everything», as Saint Thomas comments on *De anima*. This human somatology transcends the notion the human body is merely an accident of quantity, as empirical sciences and anthropological dualism would have it, towards a substantial understanding of it that exhaustively affirms the indissolubility of the body-soul unity, dignity, and beauty of the human body as the materiality of the human person. This is precisely what we find in the dual synthetic vision offered by hylomorphism.

Despite the similarities with Aristotle, there are very profound differences in Thomist anthropology, for Saint Thomas, beyond his philosophical genius, does not separate rational and supra-rational sources: faith and reason. The difference lies in the notion of being as act and continues in the conception of the soul as the first act of matter, the origin of the human soul, its spiritual condition, the relationship of the soul with spiritual faculties, the destiny of Man after death and the resurrection of the flesh. The existence of the spiritual world «can be conjectured with human reason, but it is only demonstrated from faith»⁵⁶. As we glimpse these horizons of knowledge, human reason is guided by signs in its engagement with the science of faith. But before considering theological knowledge in concerning the question of the origin of mankind, we must still address two philosophical questions necessary to interpret the findings of biological and paleoanthropological sciences: the notion of species and the question of the ultimate principle of reality.

⁵⁶ LOBATO, A., «El cuerpo humano», in LOBATO, A. (ed.), *El hombre en cuerpo y alma*, Valencia: Edicep, 1994 (99-335) 121.

As one of the most salient questions of life sciences, there is a great deal of dispersion in the biological conception of species. Roselló-Mora⁵⁷ identifies over twenty-two different concepts while De Queiroz⁵⁸ points to twenty-four different definitions of species; clear evidence of the lack of consensus within the scientific community and the difficulty, if not impossibility, of a universal concept of species. The most common concept of species, the biological species concept (BSC) from Dobzhansky⁵⁹ and further developed by Mayr⁶⁰ is based on the notion of a reproductive barrier and defines it as the set of individuals or interfertile populations among themselves, whose offspring is fertile and has reproductive isolation from other populations. This concept is not exempt from problems and exceptions that relativize its universality since it applies only to beings that engage in sexual reproduction.

This difficulty, a touchstone for science, is illuminated clearly through metaphysics that know and preach the essence as a principle of specific diversity in the universe. This issue is crucial to our interdisciplinary research, as it highlights the inability of paleoanthropology to state clearly and accurately that the «species» described in the fossil record constitute different species of Man, as affirmed in the scientific literature; apart from the contradiction in terms, this question is easily resolved in hylomorphism, which regards Man, the singular or first substance, as an inseparable unity of two constitutive principles with form as the principle of the unity of mankind. Anthropology affirms that *Homo habilis*, so named precisely because of its ability for industry, as with all other *paleo-* or *morph-species*, has a rational form or soul, thus belonging fully to our species, «Adam was no Apollo».

Finally, in philosophical terms, we come to the question about the ultimate foundation of all that exists. In this question we find, evidently with cer-

⁵⁷ ROSELLÓ-MORA, R., «Opinion: The Species Problem, Can We Achieve a Universal Concept?», *Systematic and Applied Microbiology* 26 (3) (2003) 323-326.

⁵⁸ DE QUEIROZ, K., «The general lineage concept of species, species criteria, and the process of speciation: A conceptual unification and terminological recommendations», in HOWARD, D. J. & BERLOCHER, S. H. (eds.), *Endless forms: Species and speciation*, New York: Oxford University Press, 1998, 57-75. DE QUEIROZ, K., «Species Concepts and Species Delimitation», *Systematic Biology* 56 (6) (2007) 879-886.

⁵⁹ DOBZHANSKY, T., «A critique of the species concept in biology», *Philosophy of Science* 2 (1935) 344-355. Cfr. DOBZHANSKY, T., *Genetics and the Origin of Species*.

⁶⁰ MAYR, E., *Systematics and the Origin of Species from the Viewpoint of a Zoologist*, New York: Columbia University Press, 1943, 334. MAYR, E., *Animal Species and Evolution*, Cambridge, Massachusetts: Harvard University Press, 1963, 797.

tain nuances, two opposing worldviews. For materialism, the matter is the first reality from which everything else is derived. From this physically necessary foundation, or chance, or perhaps from a combination of both, all that is human arises: the body, the mind, the highest thoughts, etc. The human mind emerges from material processes that, as such, are blind and purposeless. Instead, worldviews that conceive the first reality as something more like a mind that, as such, thinks and wants, from which everything arising from it is consciously created, planned, and ordained for a purpose. In facing this theoretical contradiction, the intelligibility of natural beings, and the undeniable purpose we find in living beings, the second conception rather than the materialist vision appears to provide a better solution; although, as mentioned, materialism or, rather, materialisms, because there are many kinds, are hypotheses that deserve rigorous consideration.

We have travelled the *upward* path of knowledge about Man and his origin, starting from the conclusions of the natural sciences to delve into philosophy; we will now follow the *descending* path, more typical of the theologian, which considers mankind from the position of God's plan, the Creator who leads him lovingly towards the fullness of life in union with Him. We will not engage here in theological speculation but merely expound some truths of faith that touch on the material object of the present paper: Man and his origin.

The first problem that the contemplation of the universe, immeasurable in its greatness, unimaginable in its dimensions and ineffable in its beauty excites in the mind of Man is the origin of the world and himself, in which that admirable cosmos becomes aware of its existence, greatness, order, and beauty. Human reason does not reach a complete and true explanation for this problem. The Bible begins right there: «In the beginning, God created the heavens and the earth» (Gen 1:1). Faith teaches *Ex-nihilo* creation. There are many scientists who, when faced with this issue, think that creation is starting a process, but creation is not that. Creation means dependence on a necessary and transcendent being that is Being itself. Creation is *ex nihilo*, out of nothing, absence of being, and the created does not exist in itself. All of creation is encompassed within the one creative act of God, hence we cannot speak of a before or after in reference to the creative act, for it is an act of God and therefore timeless and eternal. This is not something that happened millions of years ago, like the Big Bang, or something that has happened many times, such as the retouching of Intelligent *Design* (ID); this,

in our opinion, is the error of Intelligent Design. Movement is the essence of the contingent being which encompasses the creative act and thus creation can be understood as a process taking place over time in an evolutionary manner.

Man, every Man, within that creation, is therefore not the result of a material process of transformation but is the creature of God in a more specific way. In Paragraph 6, Article 1 of the *Catechism of the Catholic Church* dealing with Man, we find some points that are especially relevant to our purpose: «So God created Man in His own image; in the image of God He created him; male and female He created them» (Gen 1:27). Man occupies a unique place in creation: «made in the image of God»; combining in his nature the spiritual and material world; created as «man and woman»; «God established in him his friendship» (356) and below: «Being in the image of God the human individual possesses the dignity of a person who is not just something but someone» (357). With regard to the personal condition of the human being, consider the following statement by Robert Spaemann:

Someone does not come from something. If the person were a state, they would arise gradually. But the person is someone who passes through different stages, thus containing all stages. The personal being is not the result of development but the structure characteristic of development⁶¹.

Although Spaemann is thinking in terms of ontogeny, we can read his phylogenetic thinking and thus understand that the personal condition of the human being in no case emanates from the evolutionary process, nor does it reside in its singular faculties.

Faith does not affirm the first Man less than it states of each of us, for «because of its common origin the human race forms a unity. From one ancestor God made all nations» (Hch 17:26; cfr. Tb 8:6):

O wondrous vision, which makes us contemplate the human race in the unity of its origin in God... in the unity of its nature, composed equally in all men of a material body and a spiritual soul; in the unity of its immediate end and its mission in the world; in the unity of its dwelling, the earth, whose benefits all men, by right of nature, may use to sus-

⁶¹ SPAEMANN, R., *Personas. Acerca de la distinción entre «Algo» y «Alguien»*, Pamplona: Eunsa, 2010, 83.

tain and develop life; in the unity of its supernatural end: God himself, to whom all ought to tend; in the unity of the means for attaining this end; ...in the unity of the redemption wrought by Christ for all (Pius XII, Enc. *Summi Pontificatus*, 30, 31; cfr. Vatican Council II, *Nostra aetate*, 1)⁶².

Unity of origin, nature, purpose, and means of redemption. How many human species, therefore, in the light of Revelation? If a logical analysis of the subject of the question, human species, as mentioned above, answers the question: if species, not all humans, if humans, a single species.

The profession of the Christian faith that we find in the *Catechism of the Catholic Church* also tells us about the ontological structure of the human person. «The human person is (...) a being at once corporeal and spiritual» (362); «soul signifies the *spiritual principle* in Man» (363) and the body of Man «is a human body precisely because it is animated by the spiritual soul» (364). And that soul is immortal (*Fifth Lateran Council*, 103, DS1440).

The universe is the whole of all finite beings and in it we find degrees of being: spiritual bodies, corporeal bodies, and Man occupying the center, linking spirit and matter. This ontological position is the source of the human mystery and the reason why the idea of Man moves from one order of being to another. This dual vision always supposes a difficult balance; it is difficult to think of a spirit unseen by natural reason; it is even more difficult to consider the spirit today, given the scientific tendency to reduce all data to quantity and relation while suppressing qualities and forms, erasing differences and offering a homogeneous vision of the universe with only differences of degree between beings.

In 1950 the Magisterium of the Church through the Encyclical *Humani generis*, Pius XII pronounced on two hypotheses relevant among evolutionary ideas:

The Teaching Authority of the Church does not forbid that, in conformity with the present state of human sciences and sacred theology, research (...) take place with about the doctrine of evolution, in as far as it inquiries into the origin of the human body as coming from pre-existent and living matter – for the Catholic faith obliges us to hold that souls are immediately created by God⁶³.

⁶² *Catechism of the Catholic Church*, August 15, 1997, 360.

⁶³ PIUS XII, Enc. *Humani generis* (August 12, 1950), 36.

Quoting Saint Paul (Rom 5:12-19) and the Council of Trent (*Council of Trent*, 5, cann. 1-4) the Magisterium comments of the hypothesis of polygenesis:

When, however, there is a question of another conjectural opinion, namely polygenism, the children of the Church by no means enjoy such liberty. 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 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 own⁶⁴.

The profession of faith of the Catholic Church teaches that at the origin Man was constituted by grace in friendship with his creator and in harmony with himself and with creation, in a «state of holiness and original justice» (*Council of Trent*, DS 1511) envisaged by God's plan which is lost by original sin. Given the facts from the paleoanthropological research, we have considered, perhaps we can think that as a result of original sin and the expulsion from paradise, where elevated to the grace and love of God, he enjoyed preternatural gifts, returns to his precarious biology as a *Homo habilis* who, being already a humanized man, from which he will gradually become independent by morphological changes, selecting those morphological characteristics that allow the expression of his spiritual being (hominization) in a slow evolutionary development that lasts approximately three million years until reaching the fullness of time in Christ.

Charles Darwin definitively established the theory of evolution with his work *The Origin of Species* (1859) and later in *The Origin of Man* (1871) in which he proposed the notion of transformism to account for the appearance of Man. We believe the theological knowledge expressed here regarding the origin of Man and his position in Cosmos, explored in both ascending and

⁶⁴ PIUS XII, Enc. *Humani generis* (August 12, 1950), 37.

descending paths, conforms to both the available scientific facts and theological dogma, as we shall explain in the next section as the central hypothesis and conclusion of the present work.

8. ALTERNATIVE HYPOTHESIS

Faced with the dominant thinking regarding the origin and uniqueness of our species, materialistic-emergent monism... Are there other possibilities?... Is Man intelligent because he is bipedal and has hands, or rather he has hands because he is intelligent? Do you speak because you have vocal cords, or rather you speak because you have something to say?... Such rhetorical questions in fact have a profound importance, expressing an alternative interpretation.

An alternative hypothesis to the notion that the evolution of Man is the result of blind chance and his rationality arose through temporal becoming, with hominization (the somatic aspect) being simultaneous to humanization (the rational and cultural aspect) is one that considers the gradual process of specialization, or hominization, to be posterior to humanization: that is, first is Man, then his morphological variation, selecting the morphological and functional (at random) changes that allow a better expression of his rational being. That is, humanization is pre-hominization. The first thing is to be Man, with the human soul passively governing morphological destiny.

Indeed, the sequence of morphological and physiological changes leading to the human biological form is usually explained by the same laws that seem to govern the appearance of other animal species: variation, adaptation, and selection. Among animals, when a new form appears, it diversifies and adapts to different environments. The same form evolves simultaneously in different ways in different environments, producing shapes better adapted to different ecological niches (adaptation). Those best adapted survive and thus, the most suitable genotypes are selected from those arising the random accumulation of genetic mutations.

However, in the case of the genus *Homo* this adaptive radiation, resulting in different species is not found. Rather, there appears to be a continuous sequence (and sometimes overlapping in time) from the oldest specimens of the genus *Homo* (*Homo of Afar*) to *Homo sapiens*, with gradual cerebral specialization. As seen in Figure 1, this morphological evolution is linked to the manufacture of increasingly perfected lithic tools. That is, we find ascending para-

lism between cultural manifestations (technical) and morphological evolution to the present Man (*Homo sapiens*).

As mentioned above, this parallelism can be explained in two ways: firstly, through the emergent hypothesis, assuming that Man emerges as intelligent at a given time, or secondly, through a process of morphological transformation that is guided by that rationality, thus resulting in successive morphological transformations through the evolutionary processes, selecting forms for the more favourable expression to the exercise of rationality. The latter hypothesis offers an effective explanation to the morphological insufficiency of human beings. In fact, unlike other animals, Man («naked and bare-foot and without cover or weapons») is a misfit in his environment and becomes independent of the environment: without the need for morphological adaptation. The animals undergo modifications for more advantageous adaptation to the environment whereas Man adapts the environment to his needs through technique. Thus, adaptive radiation does not occur in the genus *Homo*. Finally, according to our hypothesis, Man's morphological change is strongly associated with his rationality, which is precisely the meaning of the term «rational animal», a *reasoning being*. Through his rationality, *Homo* transcends the processes of natural selection by showing himself, as the Greeks always saw him, as a natural being that rises above nature. We can therefore affirm that Man is a being *unbecoming* of biology.

The hypothesis of the primacy of *humanization* over *hominization* is certainly more plausible than the emergentist stance.

We can briefly conclude that the worldview that understands the ultimate foundation of all that exists as intelligence and the bio-psychic unity of Man, explained by hylomorphism and the spiritual nature of the human formal principle, constitutes theoretically an explanation that best suit the current conclusions of the biological and paleontological sciences and the profession of faith of the Catholic Church.

Bibliography

- ARGUEA, D. et al., «The affinities of *Homo floresiensis* based on phylogenetic analyses of cranial dental and postcranial characters», *Journal of human evolution* 107 (2017) 107-133.
- ARISTOTLE, *De Anima*, Oxford: Oxford University Press, 2016.
- BOTO, L., «Horizontal gene transfer in the acquisition of novel traits by metazoans», *Proceedings of the Royal Society B*, 281 (1777) (2014) 2013.2450. <http://dx.doi.org/10.1098/rspb.2013.2450>.
- BRITTEN, R. J., «Transposable elements insertions have strongly affected human evolution», *Proceedings of The National Academy of Sciences of The United States of America* 107 (46) (2010) 19945-19948.
- CARROLL, S. B., «Genetics and the making of *Homo sapiens*», *Nature* 422 (2003) 849-857.
- DART, R. A., «The waterworn australopithecine pebble of many faces from Makapansgat», *South African Journal of Science* 70 (1974) 167-169.
- DE QUEIROZ, K., «The general lineage concept of species, species criteria, and the process of speciation: A conceptual unification and terminological recommendations», in HOWARD, D. J. & BERLOCHER, S. H. (eds.), *Endless forms: Species and speciation*, New York: Oxford University Press, 1998, 57-75.
- DE QUEIROZ, K., «Species Concepts and Species Delimitation», *Systematic Biology* 56 (6) (2007) 879-886.
- DOBZHANSKY, T., «A critique of the species concept in biology», *Philosophy of Science* 2 (1935) 344-355.
- DOBZHANSKY, T., *Genetics and the Origin of Species*, 3^a ed., New York: Columbia University Press, 1951.
- EFREMOV, I. A., «Taphonomy: a new branch of palaeontology», *Pan American Geologist* 74 (1940) 81-93.
- ELDREDGE, N. & GOULD, S. J., «Punctuated equilibria: an alternative to phyletic gradualism», in SCHOPF, T. J. M. (ed.), *Models of Paleobiology*, San Francisco: Freeman Cooper, 1972, 82-115.
- FREEMANN, V. J., «Studies on the virulence of bacteriophage-infected strains of *Corynebacterium diphtearie*», *Journal of Bacteriology* 61 (6) (1951) 675-688.
- GALWAY-WITHAM, G. et al., «Aspects of human physical and behavioural evolution during the last 1 million years», *Journal of Quaternary Science* 34 (6) (2019) 355-378.

- GOLDSCHMIDT, R., *The Material Basis of Evolution*, New Haven: Yale University Press, 1940.
- HARMAND, S. et al., «3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya», *Nature* 521 (7552) (2015) 310-315.
- HERRIES, A. I. R. et al., «Contemporaneity of *Australopithecus*, *Paranthropus*, and early *Homo erectus* in South Africa», *Science* 368 (6486) (2020) aaw7293 2-19.
- HOLLIDAY, R., «DNA Methylation and Epigenetic Inheritance», *Philosophical Transactions of the Royal Society of London Series B. Biological Sciences* 326 (1235) (1990) 329-338.
- HORN, S. O. & WIENDENHOFFER, S. (eds.), *Creación y evolución*, Badalona: Claret, 2008.
- HUBISZ, M., WILLIAMS, A. L. & SIEPEL, A., «Mapping gene flow between ancient hominins through demography-aware inference of the ancestral recombination graph», *Plos Genetics* 16(8) (2020) e1008895 1-24.
- JAEGER, W., «*Paideia*», México: Fondo de Cultura Económica, 1962.
- JORDANA, R., «El origen del hombre. Estado actual de la investigación paleoantropológica», *Scripta Theologica* 20 (1988) 65-98.
- JORDANA, R., *La Ciencia en el Horizonte de una Razón ampliada*, Madrid: Unión Editorial, 2016.
- KIMURA, M., *The Neutral Theory of Molecular Evolution*, Cambridge: Cambridge University Press, 1983.
- LANDER, E. S. et al., «Initial sequencing and analysis of the human genome», *Nature* 409 (2007) 860-921.
- LEAKEY, M., *Olduvai Gorge*, London: Book Club Associates, 1979.
- LEAKEY, M. et al., «New fossils from Koobi Fora in northern Kenya confirm taxonomic diversity in early», *Nature* 488 (2012) 201-204.
- LEAKEY, R. E., «Evidence for an advanced Plio-Pleistocene hominid from East Rudolf, Kenya», *Nature* 242 (1973) 447-450.
- LOBATO, A., «El cuerpo humano», in LOBATO, A. (ed.), *El hombre en cuerpo y alma*, Valencia: Edicep, 1994.
- LORDKIPANIDZE, D. et al., «A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early *Homo*», *Science* 342 (6156) (2013) 326-331.
- LYELL, C., *Principles of Geology*, London: John Murray, 1830.
- MARITAIN, J., *Distinguer pour unir ou les degrés du savoir*, in *Œuvres Complètes de Jacques et Raïssa Maritain*, IV, Fribourg: Éditions Universitaires de Fribourg, 1983.

- MARTIN, W. et al., «An Overview of Endosymbiotic Models for the Origins of Eukaryotes. Their ATP-Producing Organelles (Mitochondria and Hydrogenosomes), and their Heterotrophic Lifestyle», *Biological Chemistry* 382 (11) (2001) 1521-1539.
- MAYR, E., *Systematics and the Origin of Species from the Viewpoint of a Zoologist*, New York: Columbia University Press, 1943.
- MAYR, E., «Change of genetic environment and evolution», in HUXLEY, J., HARDY, A. C. & FORD, E. (eds.), *Evolution as a Process*, London: Allen and Unwin, 1954, 157-180.
- MAYR, E., *Animal Species and Evolution*, Cambridge, Massachusetts: Harvard University Press, 1963.
- MC CLINTOCK, B., «The origin of behaviour of mutable loci in maize», *Proceedings of The National Academy of the United States of America* 36 (6) (1950) 344-355.
- MEGINNIS, W. et al., «A homologous protein-coding sequence in *Drosophila* homeotic genes and its conservation in other metazoans», *Cell* 37 (1984) 403-408.
- MERESCHKOWSKY, C., «Theorie der zwei Plasmaarten als Grundlage der Symbiogenese, einer neuen Lehre von der Entstehung der Organismen», *Biologisches Zentralblatt* 30 (1910) 278-363.
- PIUS XII, Enc. *Humanis generis* (August, 1950).
- PLATO, *Complete Works*, COOPER, J. M. & HUTCHINSON, D. S. (eds.), *Plato Complete Works*, Indianapolis/Cambridge: Hackett Publishing Company, 1997.
- PRIETO, L., «Historia de la idea antropobiológica», *Naturaleza y Libertad* 10 (2018) 253-287.
- ROF, J., *Urdimbre afectiva y enfermedad*, Barcelona: Labor, 1961.
- ROGERS, A. R. et al., «Neanderthal-Denisovan ancestors interbred with a distantly related hominin», *Science Advances* 6 (2020) 8, eaay5483, 1-7.
- ROSELLÓ-MORA, R., «Opinion: The Species Problem, Can We Achieve a Universal Concept?», *Systematic and Applied Microbiology* 26 (3) (2003) 323-326.
- SAGAN, L., «On the origin of mitosing cells», *Journal of Theoretical Biology* 14 (1967) 225-274.
- SAHNOUNI, M. et al., «1.9-million and 2.4 million-year-old artifacts and stone tool-cutmarked bones from Ain Boucherit, Algeria», *Science* 362 (2018) 1297-1301.

- SAINT JOHN PAUL II, Enc. *Fides et ratio* (September, 1988).
- SAINT THOMAS AQUINAS, *Commentaries on Aristotle's Metaphysics*, Proemio, 2. See ROVIRA, R., *Bilingual edition of «Proemio» of Thomas Aquinas in «Commentaries on Aristotle's Metaphysics» (Unpublished teaching material)*, Department of Theoretical Philosophy, Faculty of Philosophy, Complutense University of Madrid, 2016 in E-Prints Complutense <https://eprints.ucm.es/38962/>.
- SAINT THOMAS AQUINAS, *Summa Theologiae*, Madrid: BAC, 2001.
- SANGUINETI, J. J., *Filosofía de la mente. Un enfoque ontológico y antropológico*, Madrid: Palabra, 2007.
- SIMPSON, G. C. & BECK, W. S., *Life: An Introduction to Biology*, 2^a ed., New York: Harcourt Brade & World, 1965.
- SPAEMANN, R., *Personas. Acerca de la distinción entre «Algo» y «Alguien»*, Pamplona: Eunsa, 2010.
- THEISSEN, G., «The proper place of hopeful monsters in evolutionary biology», *Theory in Biosciences* 124 (2006) 349-369.
- VAN ARSDALE, A. P. & WOLPOFF, M. H., «A Single Lineage in Early Pleistocene *Homo*: Size Variation Continuity in Early Pleistocene *Homo* Crania from East Africa and Georgia», *Evolution* 67 (3) (2012) 841-850.
- VILLMOARE, B. et al., «Early *Homo* at 2.8 My from Ledi-Geraru, Afar, Ethiopia», *Science* 347 (6228) (2015) 1351-1355.

