

Paper Title: Darwinism Design and Purpose: A European Perspective

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Abstract:

In the USA 'Issues in Biology and Religion' usually implies a debate between neo-Darwinians and Creationists or, more recently, the Intelligent Design movement. In Europe, however, the situation is somewhat different since no one really believes in creationism anymore and Intelligent Design is unheard of. Consequently the debate is completely different. It is a debate between evolutionists. The first debate is between 'Classical Darwinians' and scientists like Christian de Duve (Belgian Nobel Laureate for Medicine) or Simon Conway Morris (UK Paleontologist based at Cambridge) and is about the reproducibility of evolution. Presenting an alternative view from Gould for whom contingency rules supreme in the processes of evolution, de Duve and Conway Morris postulate that if you 'run' evolution again on a planet with more-or-less the same conditions as you find on Earth the result will be more-or-less the same. More specifically it will lead to intelligent beings that resemble us. They accept that there are no other forces that act on evolution than Darwinian mechanisms (random mutations and natural selection) but they show evidence that chance is channeled by the laws of nature. If you play dice for a very long time you can be sure that a very special result will certainly occur.

The second debate is between classical neo-Darwinians and non-Darwinians i.e. scientists that claim that Darwinian mechanisms are not the main forces driving evolution. There are in France, Italy and England two main schools of thinking in this area. One believes that there is a goal in the process of evolution and so randomness is just apparent, not real, in the mechanism of evolution. At a much deeper level evolution is more or less predictable because it has a purpose. The other supports the idea of self-organization, autopoiesis and emergence. For them these concepts are just as important, if not more important than Darwinian concepts in our understanding of evolution. In our first part we will describe these debates and the main scientists whose positions differ from the classical non-Darwinian one, but who are, WITHOUT EXCEPTION, evolutionists. It is of special interest for an American audience because it will show how the debate is much wider in this field than the narrow controversies between Darwinians on one hand and 'crazy creationists' or the proponents of Intelligent Design on the other.

It could be very surprising and interesting for an American audience to discover that there are non-Darwinian scientists who claim they support evolution more strongly than Darwinians! The reason is epistemological: Teilhard supporters who form the majority of non-Darwinian scientists in Europe, claim that the existence of purpose and directionality is better evidence for the reality of evolution than any demonstration using Darwinian concepts.

To conclude we will ask a question of a scientific and epistemological nature, namely: is there a way of applying, in evolutionary biology, the concepts that have appeared in other areas or research and which show the limitations of our capacity to understand reality e.g. Heisenberg's uncertainty principle or Gödel's theorem of incompleteness? If

so then what concept of evolution can this lead us to?

Biography:

Founder and General Secretary of the Interdisciplinary University of Paris. Assistant Professor in Philosophy of Sciences at the MBA of the Ecole des Hautes Etudes Commerciales (HEC). Director of the collection "Le Temps des Sciences" ('The Time of Science') at Fayard Editions. Member of the John Templeton Foundation Board of Advisors, member of ESSSAT.

His research is focused on the philosophical and social implications of new scientific discoveries, on the links between Science and Religion and on the way to synthesize and popularize the conceptual revolutions that have occurred during this century. He has a degree from the Paris Institute of Political Sciences (Economic and Financial Sector), a DEA of Palaeontology at the National Museum of Natural Sciences, a DESS 'Capacity to Administrate a Company' (CAAE) from the "Institut d'Administration des Entreprises" at the Université Paris I Sorbonne. He is the editor of the collective publications: *L'Homme face à la Science*, with Ilya Prigogine, Hubert Reeves, Trinh Xuan Thuan and Bernard d'Espagnat and *Science et Quête de Sens* which includes 15 co-authors amount them Charles Townes, Paul Davies, Christian de Duve...

Paper Text:

In the United States, 'Issues in Biology and Religion' usually implies a debate between neo-Darwinians and Creationists or, more recently, Intelligent Design. In Europe, however, the situation is somewhat different because very few people believe in creationism anymore and Intelligent Design is unheard of. Consequently the debate is completely different. It is a debate between evolutionists.

However, to present this debate to Anglo-Saxons one is immediately faced with a problem of vocabulary. In the United States one speaks of 'Darwinian Evolution' to indicate the process of evolution. This appears as doubly absurd (especially to a Francophone!). In fact, the idea of evolution (by this, I mean to say that all living beings share a common ancestor due to a process of descendance with modification amongst themselves) was created by Lamarck half a century before Darwin. No one has ever claimed that Darwin discovered the concept of evolution. What he found was a plausible mechanism, natural selection, which sorts random mutations. It is because this mechanism exists and that we can see its efficiency in nature, that Darwin rendered Lamarck's theories obsolete. Lamarck's mistake was to say that the "function creates the organ" meaning that the necks of Giraffes were elongated because the Giraffes tried to feed on the highest possible leaves!

Evolution is a fact. One must say it aloud and repeat. Darwinism is a theory that presents a possible explanation of this fact. Therefore to speak of 'Darwinian Evolution' is to confuse that fact with a present theory that explains it. It is as absurd to speak of 'Darwinian Evolution' from an epistemological point of view' as it is to speak of "Newtonian" planetary systems. The existence of planetary systems is a fact, and their formation and movements could be explained by diverse theories (Newtonian theories, Einsteinian theories).

In the same way that there are Darwinian theories that try to explain evolution, there are non-Darwinian theories that try to explain it too.

What is a non-Darwinian theory of evolution one might ask? All theories for which the main mechanisms of evolution are not chance and natural selection. All this surely does

not mean to say that in these theories, chance and natural selection do not exist. But they are not the main factors driving evolution. They only play a secondary role.

Such a definition seems quite simple to understand, however, my personal experience has shown me that even some great American scientists have difficulties accepting the concept of a non-Darwinian theory of evolution, often confusing fact and theory as described above.

However, we recently celebrated the 50th anniversary of Teilhard de Chardin's death who was on the one hand a great defender of evolution and for whom the convergence towards the Omega point was a force more powerful than all Darwinian mechanisms.

At the risk of shocking my readers, I will therefore affirm with great conviction that if he wanted for his ideas to be coherent, **A NON-DARWINIAN MUST DEFEND EVOLUTION WITH GREATER FORCE THAN A DARWINIAN.**

Why? Because if one is non-Darwinian it is because one thinks that Darwinism does not furnish sufficient credible explanation for evolution. A non-Darwinian must therefore furnish a mechanism or a force which is not taken into account by Darwinians but which is capable of giving a better explanation of how evolution functions. So he must be more credible than a Darwinian in his defense of evolution, because the Darwinians can only speak of chance and natural selection, which is quite limited.

Two remarks: In the United States there is already an 'evolutionary theism' however it seems badly defined as it can accommodate Darwinian and non-Darwinian thought in its framework. In addition, contrary to what some might say, (especially when people say they are 'agnostic' about evolution) it is not because one does not have a satisfactory explanation of a fact that he must deny the reality of this fact. This would be equally absurd to refuse to accept as the fact of the rotation of the earth around the sun until Einstein came up with the theory of General Relativity, on the pretext that Newton's theory did not explain to us why the earth revolved around the sun but affirmed the existence of a mysterious force which attracts the planets to each other.

The following is an anecdotal story that helps to understand why, far from drowning evolution, the Non-Darwinians could furnish in the future a better explanation of evolution than the Darwinians.

Let us imagine that the planet Pluto is completely covered by clouds (similar to the conditions on Venus). Life on Pluto exists and evolution gives birth (remarkable phenomenon of convergence, see below!) to beings similar to us but adapted (in the Darwinian sense) to the cold climate which rules there!

Seeing as how the problem of low temperatures was of extreme importance for the survival of the Plutonians, all religions of Pluto would center on weather: they would pray for thousands of years to the Gods so that the weather would become warmer. However, one day, 150 years ago (in Earth time), a young Plutonian scientist, Dharles Carwin navigated around the planet Pluto by boat and measured the atmospheric pressure all around its globe. He discovered the existence of cold and hot currents. After his return, he developed a completely revolutionary theory. According to him, - alternate cold and hot weather is a totally chaotic phenomenon related to the clashing of cold and hot air masses. The cold air is not a form of divine punishment and the warm air is not a form of divine reward. This was to become the basis of a new science: meteorology. One century after his death, his disciples, the Carwinian Meteorologists are capable of forecasting weather and especially the temperature three to four days in advance! These extraordinary results provoke on the one hand, the increasing spread of

meteorology which is taught in all the schools in Pluto and the collapse of traditional religious systems.

However, the meteorologists' forecasts are often inaccurate. The fundamentalists who adapt a literal interpretation of the religion of Pluto, in which god controls the climate, take advantage of the situation in order to develop an anti-meteorological school of thought.

For them, the climate evolves automatically in most cases, however the gods intervene regularly in order to orient the climate towards warmer or colder weather. Every time the meteorologists make mis-calculations in their weather forecasts, it is the gods intervening who have modified the climate!

The meteorologists vehemently retort that in fact this sort of conception is backwards and indeed absurd. Over the years, they improve their predictions which proves that it is the imperfection of their data collection methods and data-analysis techniques which explains their frequent setbacks in their forecasts and *not* divine intervention. The debate provokes outrage between the anti-meteorologists who have influential contacts outside the scientific world and requests for 'equal time' for the spreading or teaching of their conceptions in schools and the scientists who violently oppose, stating that such an idea would be a terrible cultural regression.

One day, a meteorologist with a reputation for being eccentric, Dichaël Menton remarks that on average the climate was even colder 200 years ago (this is the equivalent of 200 Earth years) on Pluto than now. He publishes a book in which he affirms that unknown forces coordinate the climate in the long term and that the Carwinian meteorologists cannot explain this because their processes rely on chaos and chance. Therefore, for him, the Carwinians may explain the evolution of weather only within a short period of time.

Immediately, he is denounced as a heretic by the Carwinians. To speak of unknown forces (that Menton is incapable of explaining) is a return to the pre-scientific age and this reinforces the anti-meteorologists and their absurd doctrines, the Carwinians say.

As meteorologic data has not existed in Pluto for more than the equivalent of 200 Earth years, it will take a very long time (the equivalent of 500 Earth years) before the notion of "Mentonian cycles" begins to be taken seriously. There are surely some periods of warm weather on Pluto during a period equivalent to 250 Earth years. Non-Carwinian Meteorologic schools of thought each develop their own theories as to what can cause such cycles. However, the Carwinians have the upper hand after the equivalent of 500 Earth years. They affirm with conviction that none of the non-Carwinian schools of thought have furnished a credible idea concerning the origin of cycles, and that the observed cycles may simply be due to chance. They develop an arsenal of computerized simulations in order to give credence to all this (as they have infinitely more money and sophisticated equipment to conduct research than the non-Carwinians.)

They still successfully oppose the teachings of the conceptions of non-Carwinian meteorology, which affirms that the 'internal forces' in Pluto control the climate in the long term as they oppose (and rightfully so!) the teachings of anti-meteorologist conceptions based on the notion that the climate is under the daily control of the gods.

We know well the answer to the riddle: Pluto's revolution around the sun takes 256 years. What the Plutonian are trying to figure out is the notion of the "season". However, how do you think they will arrive at this point while they have not the

slightest clue that a whole other universe exists outside of their own, that they have never seen the Sun or a star, that the difference of average temperatures between summer and winter are very slight and separated by a time which exceeds the average human life?

One will have to wait until the Plutonians construct a machine that explores the clouds. If they could look through them they would have an incredible shock, the same Humanity had to face when it passed from a conception of a small world centered on the Earth to a world containing billions of galaxies with each of them containing billions of stars.

The conceptions of materialists, as the conceptions of the believers of Pluto would be devastated and would have to be thoroughly revised. This would not be done to the detriment of religion. For example, the discovery of the universe prompted the scientists of Pluto to discover the Big Bang theory and the anthropic principle and therefore pose the question anew of the existence of God and His actions in the world but in a way that is infinitely subtler than the “non-meteorologists”.

But one thing would be for sure: the Carwinian meteorologists on Pluto will appear retrospectively as obscurantist; they would want to fight against obscurantism by avoiding their society from returning to pre-Carwinian conceptions and would have kept back several centuries of progress in scientific knowledge of the Plutonians. What a paradox for those who with the invention of meteorology, were at the helm of an essential progress in the life of the Plutonians!

In fact their error is similar to that made on the Earth by those who ridiculed the idea of the continental drift of Wegner (and by certain creationists who reject the notion of evolution on the pretext that the Darwinians did not furnish a mechanism sufficiently convincing to explain it). It is not because we do not have a mechanism to explain a fact that we must negate its existence or at the very least the probability of its existence.

To a certain extent, the ‘Carwinians’ of Pluto were good scientists, however they stayed stagnant and locked into their enclave of reductionists attitudes implying that the causes of changes that they observed in the short term were the same as the causes of changes which were produced on a larger scale of time.

Of course, my story does not concern Pluto!

- The anti-meteorologists are the creationists who deny evidence. Yes, there are intermediaries between monkeys and humans and yes, the Earth (and Life on the Earth) has existed for billions of years.
- The Carwinians correspond to the Darwinians who affirm that the random mutations and natural selection are the main forces driving evolution
- The Non-Carwinians Meteorologists correspond to the Non-Darwinian evolutionary biologists who affirm that the Darwinian forces certainly play a role in evolution but not a principal one. Among them, the “Mentionians” who correspond to those like Michael Denton, Christian de Duve, Simon Conway Morris, Remy Chauvin, Anne Dambricourt or Jean Chaline who affirm that evolution is directed, or is, in one way or another, predictable when we look at it from a large enough time scale.

Now we will briefly turn our attention to the different schools, which compose Non-Darwinian Biology.

But before we do this, one last details needs to be elaborated upon. There are at least two (and even more) categories of Darwinians and Non-Darwinians.

- **“The Strong Darwinians”**

Those similar to Daniel Dennett or Richard Dawkins, who are gradualists and adaptationists. They have made the assessment that: “Nature does not make jumps” and they consider that if a given structure exists in Nature, it is because it corresponds to an adaptation of the organism, which it was a part of. It is somehow useful to that organism. For Dennett, however, adaptationism is the fundamental Darwinian mechanism.

- **“The Weak Darwinians”**

Stephen Jay Gould, Richard Lewontin or Niels Eldredge are all clearly Darwinians. However, they contextualis gradualism and adaptationism. In a famous article, Gould and Lewontin (1) denounce the ”Adaptionism” as a Panglossian program. For them, many structures do not actually have a reason for being but rather they have appeared as by-products of other structures, which were useful for the organism.

- **The “Weak non-Darwinians”**

In their view, the mechanisms of evolution are the same as those advocated by Darwinians. However, they have certain constraints, which impede upon and radically change the image that the Darwinians give us of evolution. For Christian de Duve and Simon Conway Morris, if evolution were to begin anew, it will lead to conscious beings more or less like us which is an unacceptable claim for the Strong or Weak Darwinians who agree on one point: evolution is a contingent phenomenon, it will therefore never produce two identical results. For Francisco Varela or Stuart Kauffman, these are self-organization phenomena, which complete and modify the Darwinian vision of evolution.

- **The “Strong non-Darwinians”**

Whether they are members of the self-organization school, or they align themselves with Pierre Teilhard de Chardin’s ideas, they all consider that the Darwinian factors explain micro-evolution (the transition of one species of dog to another) but not macro-evolution (the transition from one genus to another). Similar to the “Mentonians” of Pluto (Michael Denton is a part of the Strong Non-Darwinian group). The phenomena responsible for evolution over extensive periods of time are not, in their opinion, the same as those that are responsible for small evolutionary changes than the ones we see begin before our eyes. But like the Mentonians, they have difficulties in identifying the causes of these phenomena.

Therefore here is a brief presentation of the ideas of Strong and Weak Non-Darwinian biologists who are for the most part European. The development of a Non-Darwinian evolutionary biology is blocked in the United States not only due to the confusion between facts and theories we explained before, but especially because of the presence of a strong creationist movement which reinforces Darwinism in the United States.

Exactly like in our story, the presence of anti-meteorologists on Pluto reinforces the position of Carwinian meteorologists and weakens the position of Non-Carwinian Meteorologists.

The self-organization

For this school of thought, the appearance of more complex structures is due to a “property” emerging from Life as explained by Brian Goodwin, Professor of Biology at the Open University, Milton Keynes, United Kingdom: “ Since 1859, the mechanism of natural selection and the survival of the fittest is imposed as the only explicatory thesis of Life on Earth. Origins, extinctions and the adaptations have all been studied through the prism of Darwinism. There is another explanation for the origin of the diversity of species. Similar to the Newtonian point of view of the world which predominated until the Einsteinian revolution of the 20th century, Darwinism must be replaced by a new theory which admits that the complexity is one inherent and emergent quality of life and not only the result of random mutations and natural selection. The organisms are as cooperative as they are competitive; as altruistic as they are selfish, as creative and playful as they are destructive and repetitive.” (2)

The whole is greater than the sum of parts, this is why reductionist ideas cannot account for what Life consists of. Like Mae-Wan Ho, Former Reader in Biology at the Open University, Milton Keynes, said:

“Life is a process of being an organizing whole. Life is a process and not a thing, nor a property of a material thing or structure. Life must therefore reside in the patterns of dynamic flows of matter and energy that somehow make the organisms alive, enabling them to grow, develop and evolve. From this, one can see that the “whole” does not refer to an isolated, monadic entity. It refers to a system open to the environment, that *enstructures* or organizes itself by simultaneously ‘enfolding’ the external environment and spontaneously ‘infolding’ its potential into highly reproducible or dynamically stable forms.” (3).

One of the most important words here is emergence. There is no pre-existence, even potentially or virtually of complex forms. It emerges from the development of life because it is in the nature of this process to permit this emergence.

Mae-Wan Ho and Brian Goodwin are clearly non-Darwinians. For them, the Darwinian mechanisms do not play a role in evolution. Other advocates of self-organization like Stuart Kauffman (4) or Francesco Varela give more importance to Darwinian mechanisms and can be included among the weak non-Darwinians...or the weak Darwinians. We will therefore concretely encounter for the first time, (but not for the last time) the problem of the border between the weak Darwinians and weak non-Darwinians which is fuzzy.

From a philosophical point of view, the advocates of self-organization are perceived as being, at least in Europe, linked to pantheist or animist conceptions of the World. And this is because most of the scientists of this school of thought share these conceptions (or Buddhist conceptions like those of Francisco Varela) and that the emergence notion permits to avoid a notion of a first cause in an Aristotelian sense.

Nevertheless, it has to be noted that a certain number of theologians and philosophers (among them Niels Gregersen and Philip Clayton) attempt to develop a Christian conception of emergence and of self-organization in relying among other things, on the process theology inspired by Whitehead. They enter into a debate with the advocates of self-organization in his pantheist version, like Terrance Deacon (5) to affirm the existence of a plurality of conceptions in this domain. Thinking doubtlessly that self-organization will impose itself as an important paradigm of the 21st century, they do not

want Christianity to become absent, even if the aligning of the two notions seem somewhat problematic.

Teleonomy or Purpose

Many scientists whom we classify in this category would undoubtedly protest by affirming, and with great conviction, that they do not believe in finality. They would thus give credence despite themselves to Pierre Paul Grassé who said: “ finality is like a woman with whom a biologist never wants to be seen with in public, but from who he cannot abstain! ” One can divide the theories of evolution of this present category into three schools of thought: internal logic, the reproducibility of evolution, and the existence of yet unknown factors which would play a major role in evolution.

Anne Dambricourt's work (6) shows that the appearance of the bipedality among man's ancestors is not an unforeseeable occurrence as supporters of the "East Side Story" believe. According to this last theory, the collapse of the Valley Rift in East Africa allowed the development of a savanna which created the conditions so that natural selection favours the primates carrying changes going in the direction of the bipedality. The discoveries of Anne Dambricourt on the cranio-facial contraction show that the bipedality is due to a rotation of the neural tube. And this rotation constitutes an internal process of embryonic origin which develops, while accelerating from one species to another during 60 million years. This process appears equipped with its own logic that does not seem to be disturbed by the change of the environment. Such a theory contradicts Darwinism on three different fronts: the idea that evolution is unpredictable, that it is directed mainly by the changes of the environment which create a natural selection and that it is gradual. Incidentally, it is one of the best ways (better than most Darwinian evidence!) to prove the existence of evolution to those which would be tempted to reject this fundamental concept of modern biology.

For Rosine Chandebois, the development of living organisms is not coded in the DNA. As an Embryologist and Professor at the University of Marseille, she listed experiments showing that it is the cytoplasm of the egg which is "the architect", and according to her, the DNA defines only materials employed for construction (wood here, concrete elsewhere) according to one of her metaphors. Her ideas, which can seem a lost battle against the power of molecular biology, go in the same direction than the research of young researchers such as Andras Paldi who says "the stake of the next genetic revolution will be to give again its place to the DNA in the enormous bio-chemical complexity of interactions of the living organism. We should not consider it as a dictator who directs the course of Life... I believe that we are coming to the end of a particular period of the development of genetics. It began at the beginning of the 20th century and is characterized by the key notion of the all-powerful genes, according to which the genes contain information necessary and sufficient for the development of a living organism. One realizes that this explanatory diagram has more and more difficulties to account for the hereditary phenomena which one observes" and he speaks about "channeled" chance (7).

For Rosine Chandebois, evolution is a program which proceeds since the origin like the embryonic development which goes from the first cell to the adult organism. "The genetic program of development has only existed in the collective imagination of biologists. (...) All these works lead towards the same certainty: the recipe of development is not written in the DNA! It is contained within the egg's cytoplasm which must have a particular molecular composition, furthermore a suitable organization. In other words, DNA does not command anything and is certainly not the

architect. Because it produces and provides the material for this construction, it gives the organism its originality." "The Tree of Life has been made from the first cells, the same way that the tree from the seed, exclusively through a game of internal factors." (8). Here she seems to join Michel Denton whose ideas we will consider in the next section. But the difference lies in the fact that for her the existence of a "program" in the process of evolution is due to internal factors acting on the cytoplasm of eggs.

Jean Chaline is also a specialist in development, but his most original work is to have tried to highlight the existence of a fractal structure of evolution with the assistance of an astrophysicist specialist in fractals, Laurent Nottale, and of an economist Pierre Grou. In their common work (9) as in the publication that they presented at the French Academy of Science (10) they define laws that seem to control on a large scale the evolution of Life but also that of the Universe and the human societies. Our authors reject accusations of finalism, they do not completely eliminate the role of chance, but do not hesitate to write "If you put on one line the main events of the history of evolution, you can see a law which shows you the internal logic of evolution. From this law, the next important change concerning human beings will be in 0.8 million years." "

Thus, here also, there is an internal logic that makes evolution a partly predictable phenomenon. Of the biologists whom we gathered in this school of thought, Jean Chaline is a weak non-Darwinian, because his conceptions of evolution which calls upon nongradual macro-mutation on regulatory genes attributes a key role to chance and selection. It is only in his global vision of evolution that the differences with the Darwinism appear. Our three authors are catholic. But Chaline, by no means asserts this in his works and seems to support a position of separation between Science and Faith, like the NOMA of Stephen Jay Gould (11). Anne Dambricourt is the Secretary-general of Teilhard de Chardin foundation; she affirms with force not to want by her research to prove the existence of a divine plan in evolution. Nevertheless, she has a position much more "integrationist" than Chaline as shown in her publication "The Cursed legend of the 20th century" (12). For her, "Neo-Darwinism" and materialism are two ways of thinking which make it possible to destroy the founding bases of the credibility of the notion of revelation.

Thus, if the criticism of the Darwinism leads by no means to the direct proof of a finality in nature, it reopened the doors which one believed closed by modern science, giving again a new legitimacy to certain philosophical positions. Anne Dambricourt also tells us that to observe the existence of an internal logic in evolution leads her not to be astonished to note that there are revelations in the history of humanity. Indeed, if we are a part of a process, the meaning of this process cannot be understood from within. Just as the fish cannot define what is water; one thus needs information coming from outside to be able to understand the process.

Rosine Chandebais seems to share this position: her work does not prove a non-materialist conception of Life, but brings new credibility to these sorts of ideas.

Repeatability of Evolution

One of the fundamental predictions which rises from Darwinian theory is the impossibility that evolution can reach the same goal twice. Authors as different as Richard Dawkins or Stephen Jay Gould agree on this point: the role of contingency is central in the evolutionary process (the 'bullet' is always shot randomly) and there are so many possible targets ("the range of possibilities is almost infinite"), that it is

unthinkable that the process of evolution, if it really rests on the Darwinian mechanisms, can produce the same result twice. In theory, if one received an image coming from another planet, the simple presence of a cat or a dog would be enough to disprove Darwinism. However for the three authors whom we gather in this school, evolution must more or less follow identical paths in different places.

For Christian de Duve, biochemical laws produce constraints so strict that chance is channeled and that appearance of Life, and even of consciousness occurs necessarily several times in the Universe: "According to the theory which I defend, it is in the very nature of Life to generate intelligence everywhere and (as soon as) the necessary conditions are united. Conscious thinking belongs to the cosmological map, not as a random epiphenomenon strictly inherent to our biosphere, but as a fundamental property of matter. Minds are generated and nourished by Life, which is itself generated and nourished by the remaining cosmos " (13). Christian de Duve is the most Darwinian of the authors we analyze: indeed for him yet more than for Jean Chaline, the mechanisms of the evolution are those postulated by the Darwinians. The difference comes from the fact that when one looks at evolution at the global level, one realizes that the play is "fake" and that the laws of biochemistry must lead not only to the production of Life but also (more radically!) minds. As de Duve has said in response to Einstein's famous sentence "God doesn't play dice", "God plays dice because He is sure to win! ". It is why his positions are radically different from those of the Darwinians, such as Jacques Monod, François Jacob or Gould. But because of his position concerning the mechanism of evolution, he is a very weak non-Darwinian.

In the philosophical front, de Duve affirms "I chose in favor a universe which has a meaning. Not because I wish that it is thus but because thus I interpret the scientific data we have "(13). His ideas seem close to pantheism: his work is dedicated " to Life" which is for him "a cosmic requirement".

Simon Conway Morris is currently one of the most well-respected Paleontologists. His recent publication " Life's Solution " has an extremely provocative subtitle:

" Inevitable Humans in a Lonely Universe " (14). This book analyses the numerous phenomena of " convergence ". By this, he means to say, the way in which evolution can attain goals almost identical to each other by different paths. For the Classical Darwinians " It is very unlikely that the occupants of one planet will look remotely like those of another planet ". The phenomenon of evolutionary convergence indicates that, to the contrary, the number of alternatives is strictly limited. [...] If this is a correct thesis, it suggests that an exploration of how evolution " navigates " to particular functional solutions may provide the basis for a more general theory of biology. In essence this approach points to the existence of something analogous to " attractor " by which evolutionary trajectories are channeled towards stable modes of functionality " (14 p. 309). It is remarkable to find in a book of one of the greatest living Paleontologists this notion of " attractor " used for several years now by Anne Dambricourt, and the fact that we need a more general theory of biology to explain evolution exactly like in my story concerning Pluto and meteorology!

These conceptions bring us to this: " Mammals and apes, (or any biological entity) have of course, arisen by many specific historical trajectories, but in these (and many others) instances, the various convergences of mammals and apes that are documented indicate that although any history is necessarily unique, the resulting complex forms are not simply the contingent upshot of a local and effectively random process. On any suitable planet there will, I suggest, be animals very like mammals and mammals much like

apes. Not identical, but similar, perhaps surprisingly similar “ (14 p. 308)

It is certainly one of the most provocative propositions for Classical Darwinism. But Conway Morris would add to this an even more provocative idea. On all the planets that are “ suitable for life ” evolution will deliver a species very similar to us; but the Earth is the only planet in the Universe which is suitable for life!

Because, being suitable for life imposes all sorts of constraints on a planet. Astrophysicists have discovered recently that among them, having a moon large enough to stabilize the orbit of the Earth, being protected from comets by one giant planet such as Jupiter, being situated in the perfect distance to the Sun for liquid water, having an active tectonics in a necessity. Because all these elements give so many constraints, Conway Morris thinks that Earth is the only habitable planet in the universe meanwhile, (what irony!) on all habitable planets, life is ready to reveals itself, develop and originate species with intelligence and consciousness like us!

It is a thesis with great originality, however, it is especially the first part of this theory that we must retain: the existence of convergences in evolution here on the Earth is sufficient to argue that if Life develops on other planets, it will, more or less, achieve the same result and the appearance of a species with consciousness, capable of posing existential questions. We do not have the need to receive via the SETI project a picture from another planet in order to have the same sort of evidence. The necessity of an “ attractor ” of one sort or another is also an essential element of Conway Morris’s theory which confirms the work or intuitions of Dambricourt, Chauvin, Fondi or Schutzenberger (see below for the last three).

Michael Denton goes even further. On the basis of a reasoning identical to that of de Duve and Conway Morris, he considers that the laws of biochemistry weigh more heavily on evolution than de Duve and Conway Morris think. He develops many arguments according to which evolution must not only lead to consciousness when complexity is reached, but also humanoids like us: "All the evidence available in the biological sciences support the core proposal of traditional natural theology: that the cosmos is a specially designed whole with life and mankind as its fundamental goal and purpose; a whole in which all facets of reality, from the size of galaxies to the thermal capacity of water, have their meaning and explanation in this central fact." (15). The role of chance is less important in Denton than in de Duve’s theory and this makes Denton a strong non-Darwinian. From a philosophical point of view, Denton writes: "Because of the doctrines of the Incarnation which implied that God had taken the human form, no religion depended more than Christianity on the concept of an absolutely central and singular position of man in the cosmos. The anthropocentric vision of medieval Christendom is perhaps the most extraordinary idea that the man ever formulated. It is a fundamental theory, and a radical claim. No human theory matches it in audacity, since it stipulates that any thing is referred to the existence of the man. Four centuries after the scientific revolution had appeared to destroy this idea, to banish Aristotle and nullify any teleological speculation, the ceaseless flood of discovered was spectacularly found in favour of teleology. Science, which for four hundred years had seemed the large ally of atheism finally became, at the end of the second millennium, what Newton and much of his first partisans had ardently wished: the defender of the anthropocentric faith "(15). Thus one can "exorcise" the "phantom of Copernicus". The man is not any more in the center of the universe in the geographical point of view but finds, in a more subtle way, a central place as a goal of the evolution of the universe.

But Denton had not only published his ideas in books that have been widely reached. He has also published his ideas in prestigious peer-review journals like “ Nature ”.

His actual work is on the folding of proteins. He argues that "protein folds found in nature represent a finite set of built in, platonic forms. Protein functions are secondary adaptations of this set of primary, immutable natural forms". This has very important implications: "It will mean a return to the pre-Darwinian conception that underlying all the diversity of Life is a finite set of natural forms that will reoccur over and over again anywhere in the cosmos where there is carbon based life"(16). After having been able to publish such a conclusion in "Nature", he published with two collaborators another article with an evocative title: "The protein folds as platonic forms: new support for the pre Darwinian conception of evolution by natural laws" (17)

Existence of Unknown Factors

In this "school", we gather a certain number of scientists who think that the mechanisms postulated by neo-Darwinians theories cannot explain macro-evolution, (i.e. not the passage of a species to another but of one genus to another). They deduce from some facts in paleontology that other mechanisms had to exist in the past to allow transitions between two embryonic ‘blueprints’. Indeed, in such a vision, it is necessary to reason not in terms of species but in terms of embryonic blueprints (all dogs share with wolves and foxes the same genetic blueprint and one can pass from a member of this group to the other by Darwinian mechanisms but the Felines represent a different genetic blueprint from canines etc...).

Remy Chauvin, Ethologist and Professor Emeritus in the Sorbonne is the author of many critical works with regard to the Darwinism (18) (19) (20). His aim is to show that natural selection does not have the capacity that Darwinians claim it has. And that natural selection cannot explain certain extraordinary adaptations. He also takes up the idea developed in the USA by Tom Bethell for whom Darwinism is a tautology (it predicts the survival of the fittest. But which are the fittest? Those that survive!). For him, it is clear that there is a program in evolution, which raises the question of the existence of a designer. He does not hesitate to speak about finality while specifying that it is necessary to have of this concept a sight much less naive than that which had course before the modern time. He is perplexed concerning the goals of the designer: “ who will not be moved by witnessing his work; an immense curiosity, a certain terror, undoubtedly moderated by a certain hope" (19), even if it is clear for him that the development of psychism is one of them. In one of his books (18), he concentrates on convergences like Conway Morris in “ Life’s Solutions ”.

Roberto Fondi, paleontologist, Professor at the University of Sienna, defends an “ organicist ” position which he defines as follows: "the whole is more than the sum of the parts. Totality determines the nature of the parts. One cannot understand these parts as long as they are considered separately, without reference to the whole. The parts are dynamically connected between them in a ceaseless interaction and an interdependence. Consequently, the analytical approach, mechanist and atomistic, characteristic of traditional Newtonian physics, prove inadequate to understand Life as a whole, or in its various animal or vegetable expressions "(21).For Roberto Fondi, the genus do not appear by chance. They pre-exist in a potential form. The embryonic blueprints are thus the materialization of archtypes. Evolution is discontinuous, it goes from one archetype to another. Like Remy Chauvin, Roberto Fondi calls upon quantum physics to clear the way by which still unknown factors could act on evolution.

Giuseppe Sermonti, Geneticist, Professor at the University of Perugia is the joint author of a critical work on Darwinism with Roberto Fondi (22). He also shares the idea that the transition from an embryonic blueprint to another (not the transition from a species to another, because this is micro-evolution only) requires a macro change which cannot be produced by Darwinian mechanisms. The genetic discoveries do not confirm the Darwinian theory because the changes are too seldom positive. Sermonti provoked a scandal by saying that the leaders of the contemporary Neo-Darwinism know this fact perfectly well and that they are dishonest by preaching continuously a theory in which, privately, they do not believe in any more. For him also, there is definitely a finality in evolution.

Jean Dorst, zoologist, member of the French Academy of Science, former Director of the National Museum of Natural History also shares the idea that the Neo-Darwinism cannot explain the great transitions which took place during evolution. He believes in finality and underlines the explanatory insufficiencies of Darwinism. "The Darwinian scientist is like a man who looks for a black cat in a black room and shouts that he has found the cat... when there is no cat". (23) "

Marcel Paul Schutzenberger, medical doctor, biologist and mathematician, criticizes the Darwinism starting from the information theory of which he is one of the founders. For him certain levels of complexity cannot be reached by processes of trial and error, as those which are postulated by Neo-Darwinism. Some Darwinians such as Richard Dawkins tried to produce algorithms to simulate evolution. It is what makes it possible for specialists in simulation to show that this approach does not permit an explanation of the evolutionary phenomenon. These ideas are currently taken up by Pierre Perrier, Specialist of computer modeling, Member of the French Science Academy.

In this article, we have seen the ideas of a dozen scientists (among which some of them are of a very high level) without really being able to develop them: all are specialists of a field having a link with evolution (paleontology, zoology, ethology, genetics, biochemistry, molecular biology, embryology, mathematics).

All take some distance with the neo-Darwinism orthodoxy having a link to the shift from orthodox neo-Darwinism; some only a little, others much more. The reasons for which they deviate can strongly vary one to the other. What is significant is that they all contradict one of the central points of Neo-Darwinism: non-reproducibility of evolution, inexistence of a program or a finality in evolution, natural selection as the main driving force of evolution, mutations occurs only by chance...

The most important is not so much the nature of criticisms which they make against Darwinism. Why, one might ask? Because there is a confusion in the public's understanding. All the scientists say that they accept evolution. Therefore, all the scientists are Darwinian. In fact, neo-Darwinians affirm (they generally do this implicitly but sometimes explicitly) that, if there are currently several debates, there are none on the essence of Darwinism: the fact is that the primary mechanisms of evolution are chance and natural selection.

This article has attempted to demonstrate that this is a glaring inconsistency. Numerous scientists and theologians have believed this confusion or interchangeability between Darwinian theory and evolution. Some of them thought it is necessary to reject evolution with Darwinism and have therefore subscribed to creationism. Subsequently this has led to ridicule the faith that they pretended to defend; because to deny that evolution exists has leads them to deny a great part of contemporary scientific

discoveries in Biology.

Others will try to accommodate Darwinism with the Christian faith, (“ there is no other choice while biologists think this way, one must therefore be adaptable ” a famous Catholic American philosopher said to me). It is well noted that the situation is even worse in the United States as the presence of anti-evolutionary creationists hinder the development of non-Darwinian evolutionist school of thought in biology.

What about “ Intelligent Design ”?

If Intelligent Design theorists recognize that all living beings have a common ancestor, Intelligent Design is nothing more than a particular school of thought of non-Darwinian evolutionist biology of the type: “ non random macro mutation ” similar to Schutzenberger, Denton and Chauvin’s ideas. But more extreme than them. Non-Darwinians of this sort say that we need to include something able to coordinate or channel the macro mutations (like meteorologists need a more global concept on Pluto which obliges them revisit all their world views but do not include the direct intervention of a designer) to really understand how evolution works. These scientists will not claim that this is evidence of a Creator even if it is fully compatible with such a concept.

If Intelligent Design rejects the idea of common ancestry, or even if, Intelligent Design is “ agnostic ” concerning this idea, it would be a catastrophe for any sort of non-Darwinian way of thinking. Recent history fully demonstrates that if you deny the existence of common ancestry, the concluding result of your action will be the re-enforcement of Darwinism. The existence of common ancestry is a thing of the past and not of the present. Evolution cannot be established as much as for example, the fact that the Earth revolves around the Sun but evolution is as well established as possible for a phenomenon that belongs to the past. To deny it is to re-enforce Darwinism and to discredit the non-Darwinian school of thought.

That is why I am shocked when I read on the personal internet site of Jonathan Wells:

“ Human babies need milk to survive and grow, so mammals had to exist before humans appeared. And not just any mammal. The first human baby presumably had to be nurtured by a creature very much like itself--a humanlike primate. This creature, in turn, could only have been nurtured by a creature intermediate in some respects between it and a more primitive mammal. In other words, a plan for the emergence of human beings must have included something like the succession of prehistoric forms we find in the fossil record [...]

Although this process is superficially similar to the Darwinian notion of common descent, design theory differs from the latter in maintaining that predecessors need not be biological ancestors but only providers of essential nourishment and protection. (*This means to say he thinks that the new genetic blueprints did not appear by descendance and that Design theory is not evolutionist!!! Here we can clearly see a conception where baby homo sapiens are delivered by angels and monkeys raise them, taking care of their education*) Successive organisms are "related" in the sense that they represent planned stages in the history of Life, but they are not genetically related as ancestors and descendants ” (24)

It seems that the majority of Intelligent Design theorists do not believe in the idea of a common ancestry (fortunately it is not the case of Michael Behe, the historical stronghold of the Intelligent Design movement). It is a very disturbing situation. This is why, if the keepers of Intelligent Design are (like myself) persuaded that Darwinism is

false, not for religious and political reasons but scientific, and if, as Christians (like myself) they are committed to the search for the truth; I suggest that they climb onto the nearest tabletop straightaway and yell at the top of their lungs:

“ Yes! Evolution is a fact! ”

When young Earth creationists say that the Earth is not older than 10,000 and that mankind existed during the time of dinosaurs, I tell them that if they really want to do something against Darwinism, that they should commit suicide as soon as possible!

In fact, the conversion of Intelligent Design theorists to the idea of evolution and the disappearance of young Earth creationists would be dramatic for Darwinians as this would finally free up a space in which the development of a non-Darwinians school of thought (evolutionist of course, and therefore credible) based on the different theories and ideas present in this article.

I do not want to treat here, as it is not the subject at hand, the question whether it is possible to be Darwinian *and* Christian. Those who sympathize with Michael Ruse (25) or Kenneth Miller (26) respond with an emphatic “yes” to this question. Kenneth Miller makes the point that quantum mechanics by his indeterminism, which excludes man’s complete comprehension of nature which leaves room for a possible action of God.

Nevertheless, it is on this point that I would like to cite the famous text of John Paul II on Evolution where he says that “ recent findings lead us to recognize that the theory of evolution is more than a hypothesis ”. It is very significant that the Darwinians, Christian or not, frequently cite this but never these two sentences which are found just after the citation in the text:

“ More than the theory of evolution, it is necessary to speak of theories of evolution. This plurality comes with, on the one hand, the diversity of explanations which were proposed for the mechanism of evolution and on the other hand, on the different philosophies which they refer to”

And

“ As a consequence, the theories of evolution which, by the influence of philosophies which inspire them, consider the spirit to be an emergent force of living matter or as a simple epiphenomenon of this matter are incompatible with man’s truth ” (27)

The first passage affirms in a very clear way that there is not just one theory of evolution but that there are several to choose from. The second passage seems to say that Darwinism is incompatible with the Christian Faith, as Darwinism affirms that only forces of living matters permits the emergence of all forms and their characteristics, and that one among them was the spirit which is associated with the “ Homo sapiens ” form.

Perhaps we can conclude on this topic by a joke?

Cardinal Marty, former archbishop of Paris, said one day that we could not be on the one hand a good Communist and, on the other a good Christian. Maybe we can say that it is possible to be a good Darwinian and a bad Christian or a good Christian and a bad Darwinian!

However, once we have demonstrated the existence of numerous non Darwinian alternatives, there is, nevertheless, one question which remains: the neo-Darwinians who have divided themselves into several schools of thought are still currently largely

dominant in Biology.

Why?

This is due to the nature of the paradigm presently dominating the Life Sciences. Inherited from Newtonian Classical Physics, the mechanist and reductionist paradigms conceive the universe and the human being, at least by analogy, as one would construct a watch in a factory assembly line. However, it is precisely this paradigm which has totally disappeared our day in the realm of Physics.

The physicists have already remarked upon this conceptual anomaly: current biology relies, in order to speak about the foundations of objects which constitute their field of study, on concepts which have already been refuted. It has already been said, for example, by Sven Ortoli and Jean-Pierre Pharabod, that: “The Science of the 18th century found its origins in materialistic mechanisms which explains everything by categories made up of miniscule and indivisible particles of matter, and diverse interacting forces. This primitive vision, in which many biologists still believe, has, as a result, the uselessness of religions and of philosophies which lend themselves to the existence of non-material entities. The fact that these particles of matter are revealed to be non-local mathematical abstractions, or in other words, can extend in all space and do not obey determinism have brought a fatal shot to classical materialism ” (28)

The biologists establish a sort of “protective wall” in claiming loud and clear that quantum physics concerns objects situated at a smaller scale than the cell in spite of the fact that in recent analysis mutations are due to movement of atoms. However this wall is starting to crumble. It is significant to see a book like “Quantum Evolution, The New Science of Life ” (29) written by a biologist John Joe Mac Fadden, Reader in Molecular Micro-biology at the University de Surrey (United Kingdom) while it was rather physicists such as Paul Davies or physico-chemists like Lothar Shafer who risked being in this domain.

Mac Fadden affirms that evolution is not a consequence of chance, but that rather it is directed and that quantum physics allows us to understand, according to him, how a molecule can, in order to respond to modifications of its environment, provoke the mutation of certain genes. This can seem crazy, as Lamarkism, or in other words, the idea which stipulates that mutations (sometimes) do not occur by chance but in response to changes in their environment, is the greatest heresy of modern biology.

However, Lamarkism, has experienced a revival, thanks to certain experiments like that of John Cairns at Harvard (30) as well as those of Steele (31) which seem to demonstrate that although bacteria needs to survive certain mutations, it happens at a greater rate than in other groups of bacteria of the same species which are in an environment where they do not need to mutate in order to survive. Cairns concludes that “our belief in the spontaneity of changes in most mutations is not indubitable”. However, ten years of these types of experiences have given rise to a vast debate, the position of Cairns is vulnerable due to the fact that there are no mechanisms that explain the observed phenomenon. However in re-visiting quantum mechanics Mac Fadden has furnished one.

All the ideas, theories and facts presented here bring us to a conclusion. We are, as far as evolution is concerned, in exactly the same situation at the Plutonians and their weather forecasting. We have many reasons to believe that something fundamental escapes in our understanding of evolution if we look at it on a wide scale of time, and that a new paradigm is necessary in biology. We can think that it is something as

radical as the weather forecasters on Pluto discovering the concept of seasons. We are speaking here only from a scientific point of view. We need a new scientific theory which has nothing to do with religion. But we can guess that like the Big Bang theory in comparison to the theories which preceded it, or like quantum physics in relation to classical physics, this new theory will, without proving the existence of a 'designer', be much more compatible with a non-materialist conception of the world than Darwinism. Meanwhile what we need to remember is that there is a lot of potential research while we leave the dogma of Darwinian fundamentalism (and, for historical reasons the non-existence of Lamarkien processes in nature is perhaps the most essential of all). It is not by some obscure plot that the researchers do not massively explore the leads offered to them, but by habit, the habit to *not* question, as was demonstrated by Thomas Kuhn (32) the dominant paradigm. This is why, we can believe that while biology will be liberated from this iron yoke, non-Darwinian biology will be one of the most promising scientific domains of the 21st century.

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