

EVOLUTION AND CREATION:
HOW TO TERMINATE WITH A FALSE OPPOSITION
BETWEEN CHANCE AND CREATION
AN EPISTEMOLOGICAL NOTE

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The question of chance and creation is at the heart of the speculation which currently arises from the movements opposed to the theory of evolution, in connexion with the materialist currents which resist them. These confrontations are the occasions of a great deal of passion, which confuses the dialogue between science and faith. I shall endeavour to show how these two spiritual families share the same vision of nature and of the action of God. I think it is necessary to show which one it is. On one side, we have two trends of thought: the former is the creationist position, which rests on a fundamentalist reading of the Sacred Texts – Bible or Coran – with the so-called *Intelligent Design* movement, which, without denying the value of science, argues that the use of the word *chance* by the theory of evolution calls for the intervention of God. On the other side, we find several philosophical attitudes which exclude all reference to God. There's positivism or rationalism which remain within the framework of agnosticism on the one hand, and on the other, various atheistic currents which challenge any recognition of God's action. To remain within the scope of this convention, I shall only address an item which is at the core of the controversy aroused by the theses of the *Intelligent Design*: the place assigned to chance in the theory of evolution and the Christian confession of faith. My first step will be to clarify the fundamentals of the scientific method, and of the various philosophical approaches which accompany them.

1. CHANCE, SCIENCE AND PHILOSOPHY

1.1. *Reason*

With the emergence of the rational spirit which presides over science, those who produced knowledge had to tear themselves away from the sacred vision of nature, according to which – since every phenomenon was produced by a divinity viewed as an image of man and endowed with freedom, nature could not admit anticipation or prevision. Ever since the ancient Greeks, scholars and philosophers have distanced themselves from a magical conception of existence; they have invented the notion of natural causes. According to them, nature must be understood starting from universal principles operating according to a rational principle contained in the notion of nature. The notion of law, in sciences and in social life alike, refers to the consistence of an action which rests on a fundamental order; at a deeper level than varying phenomena, a *Logos*, a Reason. The notion of nature then refers to the presence of an invariant which is of fundamental importance in the relationships between beings. Mankind, furthermore, shares in this reason; facts and laws are accessible to its intelligence. This fundamental asset of culture is still of immediate relevance. But it can be useful to examine it at the stage when it first appeared, and to observe that scholars have noticed the limits of this idealisation and that it was necessary to take into account what evades reason.

This tension lies at the heart of the debates on the theory of evolution, contradicted by an ideal which is at the same time of a scientific and religious nature. I shall approach the subject with a view to showing the errors which lie at the basis of the negations and mutual exclusions between science and faith, à propos of the post-darwinian theory of evolution.

1.2. *Various Conceptions of Chance*

The two words, chance and necessity, do not have the same meaning for everybody. They are part of a philosophy of nature which links up the various elements of evolution. In the first place, there is a compelling sequence of events between cause and effects; an act having been made, the consequence is unavoidable – as the logical order of propositions in reasoning, and even more drastically mathematical deduction, demand. But secondly, experience shows that such a sequence is not of an absolute nature. In natural processes, there are facts which evade forecasting: this is why philosophers have introduced the word chance (*tukè*). Using this word

means that the world perceived by the human mind is not enclosed within the sole logic of necessity, as expressed by the laws of nature; it must provide scope for contingency. Such acknowledgement is a sort of humiliation for reason, which has to face what evades its investigation. In view of this difficulty, there are several schools of thought.

a. The first school makes chance into an ontological reference. The word *chance* designates a universal force which acts on natural phenomena. If there is an immanent rationality (a *Logos*), it is not all powerful; it is linked to another force which is called chance (a word used in games with an unforeseeable outcome, like dice). This notion revives a cosmology where necessity and chance are the demiurges who preside over the future of the world. Thus Democritus claimed that in natural processes, either physical or biological, there was a combined action between two principles: chance and necessity.

b. The second school bases their theory on a reading of nature according to mathematical principles (the model of which remains Plato). The human mind tries to understand the world by putting it in accordance with perfect forms (of which the dodecahedron is the iconic figure); but this perfection comes up against the resistance of the opposed principle, matter. This vision of nature provides a theoretical framework for the practice of craftsmen, engineers, and architects who act against the resistance of building materials in order to erect well organized, useful constructions. The mathematical orientation of modern science partakes of such a vision of nature which resists the action of the human mind and transformation. Chance points – if not to the failure of human thought, at least to its limitations. This definition of chance is quite present in modern scientific thought, in its mathematical treatment of natural phenomena. Chance – let's say ignorance – is minimised by a statistical approach which leaves the individual in the background and formulates general rules.

c. The third school of thought (the model of which remains Aristotle) considers that matter is not an obstacle, but a principle or a cause. There is no opposition, but a correlation, and cooperation, between this cause and the others (the shape, the producing agent, or the end). They all pertain to chains of action. Now, the chains of causality are independent; this is why there are events which evade all prevision. Thus modern science remains faithful to its sources, when it describes chance as the fortuitous meeting of independent causal series. Chance is connected to the richness of reality and its interactive complexity. Such a richness is conveyed by the vocabulary, since the word *tukè* has been translated by the Latin word *fortuna* (fortune, in English) and by the words *chance* (a classical word in English), or hope.

d. A fourth school of thought carries this notion of chance even further and claims that the concept of fortuitous events – void of moral qualification of good or evil – is the sign of a defeat of thought. This defeat is not due to the misunderstanding of actions in process, but to the lack of a global vision. Chance is due to the lack of a vision which would allow us to see independent causal series with an encompassing eye. Chance then could be defined as a lack of finality. Chance is the sign that, in natural processes, causes are not of the same order and that, even when they are, they are independent.

The present tradition in sciences offers then four conceptions of chance, namely: the sacred conception, where it is related to the divine; chance as defeat of mathematical perfection; chance as resulting from fortuitous connexions which evade prevision; and lastly chance as a lack of discernible finality. It is through the fourth notion of chance that science crosses the path of theology, which confesses God's creating action. Before developing this point, one should keep in mind that any discourse on chance is very closely linked to a philosophy of nature, according to the vision of the world given by science.

2. DOES THE VISION OF GOD ABOLISH CHANCE?

The fourth notion of chance shares with the other conceptions the idea that chance shows the limits, perhaps the defeat of human reason. Such a situation has been received by monotheistic theology as an opportunity to indicate the difference between the human mind and God. For the monotheistic tradition, God is 'the Subject who knows all', 'the Living One who sees' – says the Biblical tradition, rejoining the indo-european etymology of the word deus. The immediate conclusion of this is that chance does not exist in the eyes of God.

The theological tradition dates back to the Greek philosophers who illustrated it with the following fable: two slaves have been sent by their master on some errand to the same place. Each one of them is informed only of what concerns him. Neither of them knows what the other has been ordered to do. When they meet, they believe that their meeting has been fortuitous, they think that they have met 'by chance'. In fact, when considered from the outside, their meeting was unforeseeable. On the contrary for the master, the meeting was foreseeable, since he knew what both had to do. So what can be described as chance when only one sequence of events is taken into account, is no longer that for him who has a global view of the

problem. In a hierarchical vision of actions, several levels can be identified. There is the superior point of view (that of the engineer versus that of the workman, that of the architect versus that of the craftsman, of the officer versus that of the soldier). Chance ceases to exist for him who has a general knowledge and a global vision of the whole. There is also the inferior point of view: that of the grass-roots operator, with a limited point of view. Monotheistic theology, when it claims that God knows all, also concludes that for God – who is supposed to be at the very summit of all hierarchies in knowledge – there is no such thing as chance.

It is in the wake of this hierarchical view of nature that the debate takes place today, opposing chance and the action of God – or the theory of evolution and creation or providence. Such an opposition leads to two options: one is atheism, for which the very existence of chance negates the assertion of a world regulated by God. The other one is the apologetics used by the so called current *Intelligent Design* which, in order to assert God's action, discards the scientific value of the theory of evolution, which allows for the presence on a large scale of chance in the phenomena of life.

I shall endeavour to show that such an opposition is wrong, both from the theological and scientific point of view. But in the first place, the philosophical meaning of the words chance and providence (or creative process) must be clarified, and a few misunderstandings must be repudiated.

3. THE THEORY OF EVOLUTION AND THE REFERENCE TO CHANCE

The word chance is present in the theory of evolution – in its present form – the Synthetical Theory, also called neo-Darwinian (a clumsy expression, in my view, because it presents scientific research as an ideology). This theory is scientific; it must be understood in the context of what has occurred in the perspective of modern science, which began with the mathematical approach of the sciences of nature facing unforeseeable events. The progress of science has changed the meaning of the word chance, owing to the mathematical treatment of the prediction of the future.

3.1. *Chance*

Modern science has definitely repudiated two of the various meanings above mentioned, for ideological reasons. The first meaning is the religious meaning, according to which chance is like a demiurge opposed to the Goddess Reason. The second meaning is the meaning which deals with finality.

The present meaning of the word is related to the mathematical approach to the sciences of nature. Such an approach has consisted in a study of what has been called 'probability', starting with the logics of propositions which is today clearly understood, thanks to the 'theory of measurement'. Because of this intellectual attitude, the general meaning, already mentioned, associated with the coming together of two independent causal series, has been clearer.

The term 'fortuitous' has remained in use, to convey what is of the order of everyday life. In the sphere of physical studies, when one has formalized the study of probabilities, the word 'aleatory' has come up to qualify a singular occurrence which evaded prevision. This word has first been understood in the context of the study of more complex systems where one speaks of 'determinist chaos'. Another term turns up in the mathematical treatment of statistics, the term 'stochastic', or 'randomly determined': it applies to what is caught up within the mathematical web of statistics. These two words belong to science. They have the merit of discarding the affects conjured up by the word 'chance' – when it is given the status of demiurge, or when it seems to be a persistent shadow dodging the light of Reason. One observes that rigorous scientific language evades the false debate consisting in opposing chance to science, understood along the lines of a strict determinism. Science acknowledges the aleatory character of events in stochastic processes. Chance is no longer just the correlative of ignorance; when recognized by the mathematical knowledge of probabilities, it helps to understand occurrences considered as singular events. This is why, when Darwin invented the theory of evolution, he made reference to the notion of chance, considered in the narrower sense, already mentioned. The current scientific theory does more – since the mathematical progress of the study of populations, genes, and biological factors allow a really scientific approach of vital processes.

Chance then remains a shadow which escapes a perfect approach to reality. But its presence, acknowledged and located as it is, does not nullify the project of a scientific explanation, as it appears in the theory of evolution.

One must at this stage admit that modern science distances itself from the ambitions of classical science. The latter was built on a mathematical approach, where demonstrations had a compelling character; so that the expression of the laws of nature in mathematical terms gave them an absolute character. This philosophy was grounded on the success of astronomy, a proper field for theoretically perfect movements. But this model of scien-

tific knowledge is no longer recognized today, because its ideal is not adapted to the science of life, where the intricacy of actions in a single living person is not compatible with the rigorous pattern of classical astronomy.

The theory of evolution rests on the use of the notion of probability in the perspective of a mathematical approach within the framework of a statistical study. Hence the two elements which define its status, namely: in the first place, the theory of evolution is scientific; in the second place, its status is that of a theory, according to the exacting epistemological traditions of scientific knowledge.

3.2. *The Theory of Evolution as Theory*

In the first place, the theory of evolution is scientific. It is part of the nature of science regarded in mathematical terms and therefore distances itself from any reference to finality. It rests on a pragmatological ontology and therefore excludes any form of absolute thought process. It only acknowledges the existence of a teleonomy (a tension of living systems towards unity). But this does not suffice to claim the specificity of the theory of evolution. The theory of evolution aspires to giving an explanation of the unity and the diversity of living systems, by classifying them according to a genealogical tree. So that as time has elapsed, new forms have emerged, which all belong to the category of the living. Such a tree does not aim at projecting sense into the future, but only to state how living systems have diversified. It is a historical reading; it is scientific, because it uses the present knowledge stemming from biology, and which has been verified in accordance with the scientific procedures of objectivity. But a historical reading invites one to leave room for novelty and unpredictability: this is what it does, using the vocabulary of the probability theory.

In the second place, one should highlight the fact that a theory gives a general interpretation of facts. One must therefore grant it the following status: it relies on facts, it uses interpretative principles and it builds global visions. A theory is not a collection of facts, but an interpretation of observations: it is an intellectual construction which gives a global vision of phenomena, pertaining to a specific field. Thus, the theory of evolution presents a big tree where the living systems are organized. If this methodological point is well understood, the error of those who defend the *Intelligent Design* becomes obvious: they use the occasional deficient observations (the missing links) to oppose a theory which is not a catalogue of facts, but a research program.

The criticisms made by the defenders of *Intelligent Design* to the Synthetic Theory of Evolution are groundless, because if they do place emphasis on difficulties, those difficulties fall within the scope of the global vision given by the arborescence which allows us to see them. Thus, over nearly the last fifty years, many gaps have been filled, and many hypotheses have been verified. There's even more: whenever the observations have allowed it, the tree itself has been modified. These modifications were reckoned on by the perspective given by the general theory and they have confirmed the global perspective. If unresolved problems remain, in the present state of our knowledge, they do not call into question the global vision given by the Synthetic Theory of Evolution: on the contrary, they give the opportunity and the means to work at it.

3.3. *Reductionism*

It is important, at this stage, to distinguish between two meanings of the word 'reductionism'. Science produces results, which are not raw facts: they are conditioned by a method which demands that what concurs to the explanation be only what strictly belongs to its sphere or discipline, determined according to its methodological principles. This exacting demand is called, in the critical language of epistemology, *reductionism*. It excludes resorting to considerations which are not strictly speaking of a scientific nature and therefore it divests scientific work of all religious references. However, the word *reductionism* is ambiguous, because it has two meanings and it is important, as I said, to distinguish one from the other.

The first meaning is methodological. The word then simply signifies that the scientific explanation under no circumstances resorts to the 'non natural' – the 'supernatural' as we say today, in a sense which is not the sense of Christian theology. When science considers a fact, it takes hold of it inside the web of its means of perception, measurement, formalisation and inscription within the framework of the laws of nature. This is valid for neurosciences which bring about a reduction of what seemed to be the fundamental quality of man: his spirit, his conscience, his thought... Such methodological reductionism is necessary.

The word has another meaning. No longer pertaining to the field of epistemology, but to that of metaphysics. The reductionist option is philosophical, since it consists in saying that only a scientific method can approach reality and that anything that is not of a scientific order does not bear the stamp of truth. Thus, a discourse making use of supernatural

beings – fairies, gods, angels or demons – belongs to the realm of fiction, to an archaic stage of learning, legitimate with children or the peoples which rationalists call for that reason ‘primitive’. They have access to the kind of reason that knows that it is impossible to prove the existence of such entities through objective observations. Such a reductionism is found in various metaphysics which share a certain monism, in so far as they systematically use the adverb ‘only’, as though there were ‘only’ what falls under the scrutiny of science which could be considered as real. Science would be the exclusive approach to truth. This is a metaphysical option which is no longer scientific. It contradicts itself by denying through a metaphysical statement the value and the possibility of metaphysics.

If the first meaning is imperative for all, scientists, philosophers and theologians, the second meaning cannot possibly be held as valid by epistemological criticism. So that a free space opens up in order to deal with metaphysical perspectives concerning the origin and the end of life.

4. CHANCE AND CONTINGENCY

This definition of the status of reductionism of science leaves room for a philosophical dimension. This is what we are now going to deal with. In order to do so, we must consider reality from a new perspective which is specifically philosophical, starting from our human experience getting involved in a process of transformation of reality. We then come across a term: that of contingency.

4.1. *Ontological contingency*

The word contingency is part of the philosophy of nature. It stands in opposition to the word necessary. Contingent is what is not necessary. But this definition does not apply only from the descriptive point of view of science. It also addresses the question of how to exist in the present time. In this perspective, one can say that what exists is contingent, but could well not be. Not only as possibly not having been, or as doomed later to cease to be, but as not being in the very act of being. It is important to highlight the fact that the word *contingency* is here used in a sense other than the sense it has in sciences, where it applies to statistical laws or aleatory phenomena – but that it does not contradict it in any way.

The use of the word contingency serves the purpose of dealing with a question which is no longer only of a descriptive nature, but belongs to the

world of the philosophy of nature or to the world of ontology, therefore to the sphere of metaphysics. I shall describe as contingent not only an event occurring in a series of events, but also its ontological status. A being is said to be contingent because he exists but could very well not be, not only in the future, but also in the present and in the uninterrupted succession of moments which constitute his lifetime. These ontological considerations are particularly relevant where living systems are concerned.

To live is indeed to perform the acts which allow one to overcome death: to feed, to develop, to reproduce... Such an act is contingent, it is not necessary; it is part of its beauty and its grandeur. Ontological contingency is shown and even enhanced by the theory of evolution when it expresses itself in the language of mathematical statistics.

4.2. *Contingency in Nature*

The concept of contingency as defined above is not foreign to what the present theory of evolution offers. The word 'contingency' appears under the pen of scientists. The fact that an iconic figure of contemporary research (Stephen Gould) uses it, shows that he means to address a new question. It is not enough for the theory to redefine the tree which allows to classify the living systems and to unveil their unity and their diversity; the theory also insists on answering the question, why has the tree such a shape? It is not enough to explore the mechanisms of evolution – since the word mechanism conjures up a deterministic philosophy to the mind. One has also to pay attention to the production of novelty, as a characteristic of life.

The theory of evolution allows one to narrate the history of life. It is marked by contingency. Which means that with hindsight the human mind can survey the past course of events; but if one places oneself at the beginning of the historical sequence, one must admit that it cannot be inferred by pure mathematical calculation. The chaos theory shows that the limits of prevision are real. The future is based on conjecture. It is not an uncertainty which would result from ignorance; it is related to the very nature of life, whose main characteristic is to produce new developments. If such a possibility climaxes in human beings, it is present in all living systems. If Plato claimed that ignorance had something to do with the imperfection of matter, in this case ignorance relates to the ability of producing new developments, therefore to what is of value.

Current science no longer rests on the deterministic paradigm of the classical age (Descartes, Newton, Laplace, even Einstein) but on a para-

digim where the present opens on to possibilities which are not strictly determined in advance. It may be of use to add that this is inscribed at the very heart of matter – in so far as quantic indeterminism reveals the rich energy held by bodies in physics and chemistry. At this stage, let me point to the awkwardness of those who support *Intelligent Design*, and confine their argumentation within the framework of the deterministic paradigm. They do so in cosmology, by recurring to the notion of the anthropic principle based on *fine tuning*. They do so in biology, when they claim that the indeterminism of genetics (of the individual, or of populations) has something to do with ignorance and not with the nature of the action connected to genes. The characterisation of the richness of life by the appearance of new developments logically leads to the question of creation. It is possible now to open a reflexion on the problem of creation without betraying the principle of a scientific approach.

5. CREATION

The word *creation* introduces a new perspective. It has several meanings. This is why it is important to throw some light on a term which originally refers to a strictly theological concept, within the framework of monotheistic thought.

5.1. *A total production of being*

The word *creation* has become quite ordinary today. It indicates something new. An action is said to be creative when it causes something to appear which was not there. The word 'Creativity' is used to describe the ability of artists to create new things. The theological sense of the monotheistic tradition is more limited. It refers to the total production of being by a unique and transcendent God. In the active sense, it designates the act which produces all beings and the whole being of all. In the passive sense, it designates the result of such an action. I shall use it in the active sense.

In the theological discourse, the word 'all' indicates that it is not a matter of transformation, the passing from one state into another state. But in human action, if something new occurs, it is a relative novelty: it is a matter of passing from one condition to another. Let us remark that the use of the theological term is due to the desire to voice the value of the happy process by keeping the quality associated with the theological language. To be quite

accurate, one should notice that the word is used in a metaphorical sense; for in the theological sense, creation is a total production and therefore the passing from nothingness into being; whereas in human actions, the old adage is verified, according to which ‘nothing can be made with nothing’.

The theological notion of creation does not have its place in science, and therefore not in the theory of evolution. The theory of evolution tells the story of living systems and describes the process of coming into being. This notion describes a continuous process – a transformation in the etymological sense of the word. Unfortunately, many scientific treatises use the word creation to describe the appearance of something new. It is a misuse of language. The word creation is only metaphoric and one should avoid using it. Unfortunately common language multiplies such confusions and many scientists use the word wrongfully, thus aggravating misunderstandings, by limiting the action of the creator to the very beginning of the process under scrutiny.

5.2. *An act in the present*

Because of this, the notion of creation demands further clarification. Creation refers to the act through which God causes being to spring from nothingness – according to the traditional image. Such an act occurs in the present. The term *creation* does not limit its sense to the production of being at the very beginning of its duration. The word describes the act by which something exists throughout the span of its existence.

The most widespread image among creationists revolves around this idea: creation occurs at the beginning, and what follows is only the continuation of the first act. Such a conception compels them to consider that everything is given from the start – and therefore, to exclude the very idea of evolution or of a process leading to the creation of new things. If one understands well that creation is in the present, it then appears that such an act inscribes itself in the duration which it founds. The word creation does not deal with the question of the beginning, but with the question of origin.

5.3. *The All-Powerful Creator*

In all monotheistic confessions of faith, the All-Powerful, the Almighty, is always mentioned in relation to the notion of creation. This is another consideration which helps clarify the errors of the fundamentalists or the supporters of *Intelligent Design*. On this point, there are two impor-

tant theological schools which divide the world of thought and monotheistic religions.

According to some, the term 'all-powerful' must be understood in its literal sense: all-powerful means powerful without limits, without reservations of any kind. Will is limitless and independent of all logical constraint. God is confessed as being the almighty, capable of all, without any reservation or the possibility of any kind of demand on our part. This conception is called 'voluntarist'. It is not mine. I believe, with a great number of those who support the Tradition, that the notion of omnipotence is at the service of God's wisdom, of God's intelligence, of God's goodness. God cannot do anything that would run against His kindness, or against the demands of the logics of His action. Such is my position, which I would describe as 'sapiential'.

As he creates by His act a world different from Himself, marked by contingency, God does not contradict this existential situation. The creative act is a gift of being to a living person who not only exists, but also evolves within his own predicament, and according to the laws which control him. The creating act, therefore, does not exclude contingency, but founds it: the existence of contingent beings is therefore based on the creating act.

Traditional theology has for a long time developed this point, in relation to human freedom. The way to see the theory of evolution is wider, but it sends us back to the very notion of omnipotence.

Creationists believe that creation is an act of the All-powerful God, in the voluntarist sense of the term. They impose a vision of the world whose origin is a text which they do not bother to read in its context. God's authority imposes to deny the results of science. Such an attitude justifies, in my view, atheism.

On the other hand, discussing the all-powerfulness of God from a sapiential point of view means that the acknowledgement of contingency does not call for the exclusion of God's action. Quite on the contrary, it founds the autonomy of beings. The Christian theology which has developed in the sapiential tradition insists on the fact that God gives not only pure existence to human beings, but also the possibility of using it according to their own nature. The essential feature of creative action is to give human beings their autonomy in what they do. According to a formula by Thomas Aquinas, God confers to man the dignity of being really a cause. 'We do not strip the created things of their own actions, even though we attribute to God all the effects of the created things, in so far as he operates in them all' (*The Sum against the Gentiles*) and again 'it has already been shown that the operation of providence through which God operates in the

world does not exclude secondary causes, but quite on the contrary fulfils itself through them, in so far as they act through the power of God [...] As it is manifest that certain causes are contingent, because they can be prevented from producing their effects, it would clearly be against the notion of providence to claim that everything occurs by necessity. Divine providence does not impose necessities to things, by universally excluding contingency from things' (*op. cit.*).

These observations will suffice to show in what sense the refusal of those who oppose the Synthetic Theory of Evolution is theologically groundless. Of course, the theory is not infallible, it will be revised, but the debate which concerns it must remain strictly within the domain of scientific knowledge, and should avoid using terms which are specifically theological to discuss scientific questions.

6. THE ACTION OF GOD

The difficulty arises from the fact that there are two types of actions which must be linked up together, and their combination, or synergy, poses a delicate problem. When two actors are at the same ontological level, they must come to terms with each other – like vectors in rational mechanics. What belongs to the one adds up to, or subtracts itself from, the other, according to their orientation. But when the two active principles are not of the same order, there is no possible composition, no adding up, no subtraction. A good example which allows to understand this kind of cooperation is found in the musical field. In a piece of music, everything comes from the instrument – and everything comes from the musician. Everything comes from the one, everything comes from the other. It is impossible to divide their action – or attribute to either a percentage of the effect which results from their combination. In the same way, by acknowledging that the creator is not an agent of the same order as the forces of nature, it becomes possible to say that in the process which is described by the theory of evolution, everything is in nature – and everything is in the creator.

The error of the fundamentalists and supporters of the *Intelligent Design*, whose approach is based on exclusion, then becomes obvious. For them, the action of God can be seen in the flaws of the scientific theory, or in phenomena which cannot yet be explained.

To this awkward apologetics, can be opposed the traditional notion of creation, according to which the action of God is the founding principle of

what exists, in its very being. This is no manipulation, but the respect of what is. Thus, God knows what is contingent – as contingent.

The knowledge of God is based on several qualities, which are gathered together under the word 'vision'. The word, in fact, is about immediacy, since it describes the co-presence of separate elements in time as well as space; the word translates to convey the respect of diversity and of the normal process of time. But just as the vision does not abolish the spatial difference and the particularities of forms, it does not either abolish the temporality implied in natural processes – particularly in living systems. So that the evolution seen by God does not cease to be what it is: an aleatory process characterized by contingency, or as Thomas Aquinas said: 'The fact that God can produce by himself all the natural effects does not make other causes redundant. This does not reveal the inadequacy of the divine power, but the immensity of his goodness, which urged him to communicate his likeness to things, not only by granting them being, but also by allowing them to be the causes of other things. It is in fact in both these ways that creatures resemble God, as has been shown above – therein lies the beauty of the order which reigns among the created things' (*op. cit.*).

This is a strictly theological debate. It shows how theology is not thwarted by the acknowledgement of contingency, translated into a scientific language by statistical analyses and probabilistic approaches. Let me once again quote Thomas Aquinas: 'there are things to which God's will grants necessity, and others to which he does not grant it'. He goes on explaining: 'when a cause is efficacious, the effect proceeds from the cause, not only concerning what results from it, but also concerning the way it results from it or the way it is ... Since God's will is perfectly efficacious, it follows that not only the things he wants are done, but also that they are done in the way he wishes them to be done'. Those who to day follow closely the theory of evolution must necessarily agree with the Ancients that some things occur of necessity, and others in a contingent way. Let us remember that St. Thomas said that God wishes it to be so, 'so that there might exist a certain order among things, for the perfection of the universe'. He concludes: 'This why he has prepared in a number of cases necessary causes, which cannot fail, whence certain effects necessarily proceed; and in a number of others imperfect causes, the effects of which are produced in a contingent manner' (*The Theological Sum*).

One last remark on the action of God and the recognition of the value of the autonomy of nature. Our vocabulary is here limited by the fact that it is rooted in human action. For a human being, to act is to situate oneself in

front of nature, from an exterior point of view. So that there is a difference between a natural action and a human action which transforms reality through other means than nature alone – even if the knowledge of nature allows one to respect its laws. God, because he is a creator, is not external to nature. He does more than respect it in its laws and in its autonomy: he gives nature its laws and its autonomy. So that the creative act is in no way an intervention. It is the most intimate part of the energy at work in nature. Let us remark that this conclusion, which is perfectly justified in strict monotheistic terms, which give sense to the word creation, meets the intuitions of the oriental philosophies and religions, anxious to establish a communion between beings. This last point leads me to consider the question of finality.

7. ACKNOWLEDGING THE PRESENCE OF A FINALITY IN NATURE

Why are the links which have been established so difficult to admit? The immoderate affectivity associated with the terms chance and necessity is a fundamental part of the answer. In fact, for some people, resorting to a non-scientific principle is like the remanence of the religious feeling and the reference to providence is seen as a frame of mind that is convenient for children. For others, the acknowledgement of the aleatory is a source of insecurity. Others again consider that science is a destroying factor, in so far as it forgets what is the non-quantifiability of life... One must set aside those affects and admit that the assertion of the transcendence of God is all the more necessary, as it permits to establish the respect he has for what is done – while showing that such a respect is not a lack of power.

Ever since its birth in the XVIIth century, modern science has excluded the possibility of an explanation through finality as the Ancients formulated it, in so far as it cancelled the explanation and dispensed with the analysis. One should respect this option and therefore introduce a difference between the notion of life as defended by the Ancients and the notion of life as used by scientists.

Such a recognition does not prevent one from recurring to the notion of finality. But this is not a scientific attitude, properly speaking. It means entering a philosophical vision of nature, in order to propose a global vision, which serves to interpret the results of science by acknowledging in the first place that the process introduced by science displays a growth of complexity, therefore of realisations where diversity is assumed in a better form of unity.

It is therefore not expedient to use the notion of finality in opposition to the theory of evolution. One must admit that it is pertinent in a theological approach. The latter cannot be formulated without taking root in reality. One should then accept the fact that the old discourse should shift its emphasis, or otherwise it will appear as naive.

At this stage, it might be useful to bring back into one's mind a distinction which is traditional in theology. The wish to acknowledge God's action in present life has led theology to distinguish carefully between the two types of action that result from power. A first verb expresses the idea of power in its nature of power: to dominate. A second verb expresses the idea of power in terms of reason: to govern, that is to carry something to its end. The first term characterizes the conception of omnipotence which I have previously discarded: the conception marked by an arbitrary sovereign will. The second term characterizes the conception of omnipotence to which I have given preference: the conception which makes power subservient to wisdom and therefore refrains from acting all – and in the first place, from contradicting itself. Thus God, by creating a contingent world, does not distort the actions of the laws of statistics. The aleatory is inscribed in reality. It is not just the sign of human ignorance.

The term 'to govern' also contrasts with another word which is probably more present in the paradigm of those who support the *Intelligent Design*: to manage. The word corresponds to the paradigm of classical science which brings down the creative act to 'an initial flick' (to quote the term used by Pascal in his refutation of Descartes). The manager as a matter of fact uses the capabilities of his subordinates and the ways and means at his disposal to forward his projects. He reduces them to the role of actors involved in an action which unfolds according to the logics of material actions and human motivations. Whereas the use of the word governance conveys the idea that the aim of the act is not a project of management, where the agent is subjected to an end which is unknown to him, but that God proposes to actualize creation for its own sake, and each creature in its own order. It is to be regretted that this dimension has disappeared from the technical discourse that prevails over modern culture. The evolution of living systems, if it is technically within the operating sphere, is not enclosed in it. It leads to another realisation where contingency is the sign of a type of transcendence – the type which the moderns associate with the notion of beauty.

This analysis shows that the current polemics have a common origin. On the one hand, the deistic adversaries of evolution challenge contingen-

cy (like the supporters of the *Intelligent Design*) and on the other, atheists deny all divine action, as if divine action erased the autonomy of nature. There is, here, a misappreciation of the linking synergy between the Creator and nature. There is furthermore among the adversaries of the theory of evolution an epistemological error, because they remain within the framework of classical science under the deterministic paradigm of Cartesian mechanics, which they adapt to the level of God's action. Correlatively, atheism cannot acknowledge that the creative act founds the creatures' autonomy, i.e human freedom in the first place and in a wider sense the contingency of life.

CONCLUSION

To conclude, I would like to make two remarks on the relations that exist between science and the theology of creation.

The first remark is about the status of knowledge. A number of believers, today, go back to convictions which date back to the days of clerical omnipotence, and assert that scientific knowledge must be subservient to the religious authority – that of the Bible, of the Coran or of dogms. Since Galilei's time, we have known what misfortunes these convictions bring about. Others, more subtle, insist on science keeping within well marked limits and being forbidden from approaching certain subjects: in particular, those concerning the origins of life and mankind. This is wrong: because the limits of human knowledge should not be determined by the partitioning of knowledge, but by the way in which we approach reality. Reality, as a whole, is subjected to the scientist's scrutiny. The limit is not in the extension, but in the nature of the vision and the conceptualisation. There is no *a priori* prohibition that limits the scientists' explorations. However, they must be aware of the particular character of their method, in experimentation as well as in conceptualisation. There is then the possibility of a dialogue, since faith also looks at everything in a light which has its particular aspects. Two lights allow a better vision and can relate one to the other, with the open perspective of mediations.

My second remark concerns the status of scientific research. It seems to me that the debates on the theory of evolution should encourage us to address the question of what are the real issues of science. What are the intentions of science? It seems to me that a scientist should be aware of the fact that scientific research should not limit itself to its technical dimen-

sion. Science is different from technique. Even though it cannot ignore its operational dimension, science should not disregard the fact that its real orientation is towards pure knowledge – in which sense it can be said to be disinterested. The theory of evolution voices therefore the desire to understand what life is about. This dimension transcends the debating, the dithering, the uncertainties, the present limits of knowledge. It proclaims its greatness, and can contribute to the development of faith.