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## WHY IS MODERN SYNTHESIS STILL IN FORCE?

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**ABSTRACT.** The Modern Synthesis has been object of harsh criticism. Nowadays, one of them stems from the 'Intelligent Design Doctrine'. This doctrine questions the possibility of explaining the origin of novel living forms through the process of natural selection that acts on phenotypic characters. However, the Intelligent Design Doctrine does not reject Modern Synthesis in bloc because it accepts its contributions to understand the microevolutionary processes. The aims of this paper are: (i) To explain why the Modern Synthesis is still in force within the scientific community, and (ii) To show how the *divide et impera* strategy may clarify this situation.

**KEY WORDS.** Modern Synthesis, *divide et impera* strategy, macroevolution, microevolution, intelligent design, pessimistic induction, Realism, doctrine, theory, truth-likeness.

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### 1. INTRODUCTION

Since its origin, Modern Synthesis (hereafter MS) has had many supporters and detractors within the scientific community. In the last years, one of its antagonists is the so-called 'Intelligent Design Doctrine' (hereafter IDD). As suggested by Torres (2012), we prefer to speak of 'Intelligent Design Doctrine' instead of 'Intelligent Design Theory' since it is not a set of statements confirmed by empirical experience. According to the *Oxford Dictionary*, the English word 'doctrine' is a rather neutral name, useful to be applied to both sets of beliefs and sets of knowledges. In this paper, we are not interested in supporting the positive part of IDD, that is to say the part in which IDD claims the necessity of introducing an 'Intelligent Designer'. On the other hand, though we speak, according to the common use, of the 'NeoDarwinian theory', by this name we understand 'Modern Synthesis'. This theory is, in fact, the most influential and elaborated branch of those theories which descend from Darwin's views.

One of the main chief representatives of IDD, William Dembski (1999), has asked the following question: "Why does Darwinism... continue to

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gamer the full support of the academic establishment?" His answer claims that Darwinism is more than a scientific programme and that its supporters are committed to sustain a naturalistic metaphysical view. This answer is incomplete because Dembski recognizes that the MS is a very useful theory in the branch of evolution, especially for its explanations at micro-evolutionary level. In order to give a more comprehensive response to this point, we propose the *divide et impera* strategy. Through this strategy, we can explain why MS is still in force within the scientific community. To show this, first, we indicate what the IDD's criticism consists of; then we explain what the *divide et impera* strategy is and why this strategy can be used as an epistemological tool.

## 2. THE THEORY OF INFORMATION AND THE CAMBRIAN EXPLOSION

The problems for MS in explaining macroevolution through the mechanism of mutation and selection, are present in several evolutionary currents. For instance, Stuart Kauffman (1995) proposes the self-organization theory; Stephen Gould (2002) posits the theory of evolution by punctuated equilibrium; Gerry Webster and Brian Goodwin (1984, 1996) Structuralism; Lynn Margulis and Jan Sapp (1993, 2003) Symbiosis. They doubt the efficacy of the MS's mechanism of mutation and selection and try to give a different answer to the problems of macroevolution. What, then, does macroevolution mean? Macroevolution "covers processes responsible for the divergence among genera or higher taxa" (Arnold, et al. 2001). However, there is a broad consensus on the application of mechanism of mutation and selection to microevolution, which "refers to the processes that lead to phenotypic diversification among arrays of nonspecific geographic races or closely related species" (Arnold, et al. 2001). With this in mind, it is erroneous to claim that IDD is original, since it accepts microevolution and criticizes the MS explanations of macroevolution.

The main IDD criticism rests on the application of the theory of information to biology, due to the discovery of DNA. The DNA's structure could be analyzed through the information theory inasmuch DNA is composed by ordered sequences with sense. This means that the order of a DNA sequence is essential to its codifying, which has a specific meaning. For this, like the sense of a phrase is related to the order of its letters, the function of gene sequences is related to the order of its genes. An alteration in the order of letters made all the sentence to lose its sense, such as an alteration in the order of genes made the DNA lose its function as well.

The possibility of applying information theory to biology has opened new fields and modes of research. One of them is the question about how much information the arising novel living forms need. Mathematical theory of information focuses on the transmission of signals through a

communication channel. The content of information increases when the occurrence of an event decreases.

In classical Shannon information theory, the amount of information in a system is also inversely related to the probability of the arrangement of constituents in a system or the characters along a communication channel (Shannon 1948). The more improbable (or complex) the arrangement, the more Shannon information, or information-carrying capacity, a string or system possesses (Meyer 2004).

Dembsky (1999, p. 159) proposes the notion of 'complex specified information' (hereafter CSI). CSI is a necessary condition for the appearance of new living forms, yet CSI cannot arise just by chance. CSI needs a 'designer'. A clear example of CSI is the case of a typist. Acting only by chance, in a long sequence of letters a typist will generate complex unspecified information, and in a short sequence noncomplex specified information. "What chance cannot generate is information that is both complex and specified" (1999, p. 165). For Dembsky (1999, p. 128), "specification ensures that the object exhibits the type of pattern characteristic of intelligence" and "complexity ensures that the object is not so simple that it can readily explained by chance." Beyond the necessity or not of a designer, the question is that it is impossible to explain the complexity in macroevolution through the mechanism of mutation and selection.

IDD's criticism takes the so-called 'Cambrian explosion' as a clear example of the CSI. The IDD questions the fact that MS—through a gradual process of mutation and selection—can explain the sudden appearance of novel living forms and the necessary information to produce them within this period of time.

During the Cambrian, many novel animal forms and body plan (representing new phyla, subphyla and classes) arose in a geologically brief period of time. To say that the fauna of the Cambrian period appeared in a geologically sudden manner also implies the absence of clear transitional intermediate forms connecting Cambrian animals with simpler pre-Cambrian forms (Meyer 2004).

However, the problem is not the short period of time since it can be argued that biological time is different from the geological one (Ayala 1981). The problem rests on the mathematical probability of the appearance of the new information required by novel living forms. Such information can be now measured exactly. For example, new Cambrian animals would require proteins much longer than a hundred residues to perform many of their necessary specialized functions.

Cambrian animals would have required complex proteins such as *lysyl oxidase* in order to support their stout body structures. *Lysyl oxidase* molecules in extant organisms comprise over 400 amino acids. These molecules are both highly complex (non-repetitive) and functionally specified. Cassette mutagenesis experiments performed during the early 1990s suggest that the probability of attaining (at random) the correct sequencing for a short protein 100 amino acids long is about 1 in  $10^{65}$  (Meyer 2004).

This is the main IDD criticism, which implies a challenge for any evolution theory. There are more problems. In each step, the novel form must have adapted. If not, why is the novel form preserved by natural selection? Broadly speaking, it can be called 'super complexity' (Torres 2010). Meyer asks: Can the MS explain the increase of information in Cambrian explosion? The answer is negative.

The MS tries to give an answer to this criticism. The answer is based on natural selection preserving genetic sequences that can code for favorable characters. To do so, chance alone is not enough. What chance alone cannot accomplish blindly or in one leap, selection (acting on mutations) can accomplish through the cumulative effect of many slight successive steps. This argument is supported by Ayala (2006), who claims that selection is 'creative' in the sense that it retains the favorable characters. The argument is correct at a microevolutionary level, but it needs more empirical evidence to explain the macroevolutionary processes.

According to IDD, the MS mechanism explains many appearances of design, such as the adaptation of organisms to specialized environments (Behe 1996, 2007; Dembsky 1999, 2002; Meyer 2004). More specifically, known microevolutionary processes seem quite sufficient to account for the changes in the size of the Galapagos' finch beaks that have occurred in response to variations in annual rainfall and available food supplies. Taking in mind that IDD accepts these MS contributions, how can we explain that ID criticism affects just one part of MS theory, especially its contribution to macroevolution, but not its contributions to microevolution?

### 3. THE *DIVIDE ET IMPERA* STRATEGY

The *divide et impera* strategy is an answer to the so-called Larry Laudan's (1981) 'pessimistic induction.' According to the advocates of Realism, the pessimistic induction implies a reductionism, which is stated as follows: "If we hold current theories to be truthlike, then past theories are bound not to be truthlike since they posited entities that are no longer believed to exist, and posited laws and theoretical mechanisms that have now been abandoned" (Psillos 1996).

According to Psillos, the way to overcome this reductionism is to apply the *divide et impera* strategy. This strategy essentially questions the fact that theories are seen as complete 'blocs' to be accepted or rejected as a whole. For this reason, "it is enough to show that the theoretical laws and mechanisms which generated the successes of past theories have been retained in our current scientific image" (Psillos 1996). If the previous affirmation is correct, then it is possible that some parts of successful past theories may still be in force in the new theories.

if all kinds of claims that are inconsistent with what we now accept were essentially employed in the derivation of novel predictions and in the well-founded explanations of phenomena, then one cannot possibly appeal to their truthlikeness in order to explain empirical success. Then, Laudan wins. However, if it turns out that the theoretical constituents that are essentially employed are those that have 'carried over' to subsequent theories, then the 'pessimistic induction' gets blocked (Psillos 1996).

The key to support a realist position is to show that the truth-like components are the ones which actually contribute to the success of theories. The *divide et impera* strategy requires a careful study of historical cases. This study should follow two steps: 1. Identify the theoretical essential components of successful past theories which contributed to the success of present ones, and 2. Show that these components, far from being false, have been retained in subsequent theories of the same domain (Psillos 1999, 110-111). The clue to reach these goals, and also to acknowledge that the *divide et impera* strategy would not be considered *ad hoc*, is to show that through these theoretical changes we only keep the elements which contribute to the success of theories. This last aim is achieved (Psillos 1999, 112) appealing to the actual practice of science. Scientists themselves show that "the constituents that do not 'carry over' tend to be those that scientists themselves considered too speculative and unsupported to be taken seriously."

Originally, the *divide et impera* strategy have been conceived as a defensive realistic argument, but it can also be an epistemic tool. The reason for this is that it can answer why many past theories are still in force, at least partially. Philosophers can explain how and why a scientist rarely denies theories as blocs. Scientists always try to retain the useful parts of old theories and bring them back within new theories. Taking this strategy in mind, it is possible to explain, in one hand, why the MS is well considered by the scientific community, due to the fact that with microevolution principles we can answer many biological changes. Actually, we can consider this hypothesis as well supported. For this reason, neo-Darwinists like Ayala (2006) o Ruse (1988) justify the MS usually through classical

examples of microevolution processes. Clearly, those examples lead them to accept the theory in bloc. Yet they do not realize that there is a crucial underlying hypothesis: that macroevolution arises from known microevolutionary processes of speciation (such as founder effect, genetic drift or bottleneck effect) that do not necessarily depend upon mutations to produce adaptive changes. On the other hand, this strategy permits to give an answer to those who deny the theory in bloc as well, because they do not take in mind that the theory has empirical models at the microevolutionary level.

The *divide et impera* strategy can be regarded as an answer to why MS is still in force, and there is another, which explains this state of affairs in the so-called 'metaphysical naturalism'. The word 'bloc' is very useful to show this state of affairs. 'Bloc' means a set of people or countries joined under the same interest or the same goals. The carriage of metaphysics in science is anything but new. Contrary to Neo-Positivism, Karl Popper (1979) sets out clearly this situation, when he claims that metaphysics is not useless for science since it is actually part of science. Thomas Kuhn (1970) is well known for his elliptical references to the inclusion of many elements in the analysis of science. One of them is the idea that it is impossible to leave aside ontological conceptions in such analysis. In every 'paradigm' or 'disciplinary matrix' there are always ontological notions.

Nevertheless, analyzing the MS state of being in force only through the idea that MS is a more powerful bloc than IDD is not very fruitful. It seems like a game of strength, where the winner is the one who has more power, understood as resources, academic journals and things of the sort. In this sense, the *divide et impera* strategy proposes a rational argument that explains this situation. If we compare MS with IDD, we will set up that the first has many empirical models at the level of microevolution, while the second does not have any concrete model at all.

#### 4. CONCLUSION

The IDD criticism is based on mathematical problems that makes impossible to explain the arising of novel living forms through the mechanism of mutation and selection. This criticism is not original, as it can be found posited in symbiosis and self-organization (Meyer 2004), and affects the explanations of MS at macroevolutionary level. This state of affairs cannot be clarified claiming the presence of a naturalist metaphysical stance which denies the possibility of introducing a designer, as Dembsky proposes. Despite the fact that it is correct to introduce metaphysical instances in the analysis of science, these elements do not explain why IDD accepts MS's contributions to microevolution. Besides, reducing the dispute to these terms is to deny any rational parameter.

The answer to this problem is to introduce the *divide et impera* strategy. The fact that there is a part of MS explanations (macroevolution) under question, does not mean that there is another part (microevolution) still in force. Actually, MS explanations about microevolution are well supported with empirical models. Even so, this solution does not seem appropriate for one who is looking for an exhaustive answer. Anyhow, the state of affairs does not admit an 'all or nothing' solution. For this reason, one who denies the MS in bloc is wrong, yet to accept such theory in bloc is also wrong.

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