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The metaphysical lessons of synthetic biology and neuroscience

Les leçons métaphysiques de la biologie de synthèse et des neurosciences

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ABSTRACT

In this paper, I examine some important metaphysical lessons that are often presented as derived from two new scientific disciplines: synthetic biology and neuroscience. I analyse four of them: the nature of life, the existence of a soul (the mind-body problem), personhood, and free will. Many caveats are in order, and each 'advance' or each case should be assessed for itself. I conclude that a main lesson can nevertheless be learned: in conjunction with modern science, neuroscience and synthetic biology allow us to enrich old metaphysical debates, to deepen and even renew them. In particular, it becomes less and less plausible to consider life, mind, person, and agency as non-natural or non-physical entities.

Mots clés :
Nature du vivant
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Personnalité
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Volonté libre
Déterminisme

RÉSUMÉ

Dans ce texte, j'examine quelques leçons métaphysiques importantes, qui sont souvent présentées comme des résultats de deux nouvelles disciplines scientifiques: la biologie de synthèse et les neurosciences. J'en analyse quatre: la nature de la vie, l'existence de l'âme (le problème de l'âme et du corps), la notion de personne et la question du libre arbitre. Il est nécessaire de procéder avec précaution, et chaque « avancée » ou chaque cas doit être évalué pour lui-même. Je conclus en affirmant qu'une leçon commune peut néanmoins être tirée : en conjonction avec ce que nous apprend la science moderne, les neurosciences et la biologie de synthèse nous permettent d'enrichir ces anciens débats métaphysiques, de les approfondir, et même de les renouveler. En particulier, il devient de moins en moins plausible de considérer la vie, l'esprit, la personne et son activité morale comme des entités non naturelles ou non physiques.

1. Introduction

Science and philosophy are related in a complex manner. From its beginning, in the 17th century, modern science has been seen as an alternative to classical philosophy, that is, to medieval Aristotelianism. In his famous book, *The Origin of Forms and Qualities*, Robert Boyle argues thoroughly in order to show that hylomorphism is false and should be replaced by a conception where physical bodies are a bundle of moving particles instead of a compound of matter and form [1]. The controversy was raging and, in the end, modern science won. But philosophy was not dead, because the scientific victory

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concerned mainly natural philosophy: epistemology, ethics, and metaphysics survived and have even flourished since then.

The rivalry between science and philosophy has not ended, but is only sporadic. Usually, it takes the form of a proposal to replace philosophy or some part of it by a scientific discipline. Think of the heroic stance of Auguste Comte in the 19th century, hoping that humanity would soon reach a scientific era, after having passed through a religious and a metaphysical one [2], and of the modest conception of scientific progress suggested by Karl Popper: 'To obtain a picture or model of this quasi-inductive evolution of science, the various ideas and hypotheses might be visualized as particles suspended in a fluid. Testable science is the precipitation of these particles at the bottom of the vessel: they settle down in layers [...]. As the result of this process ideas previously floating in higher metaphysical regions may sometimes be reached by the growth of science, and thus make contact with it, and settle' [3, p. 277]. With time, science replaces philosophy, but we have no proof that it will discard all philosophy, not even that it will be always possible.

In my opinion, Popper's suggestion is historically correct and a fruitful programme to pursue. However, it is not without pitfalls. The main one is that we are generally a bit hasty and jump to conclusions that are not warranted by the current state of knowledge. The risk is particularly salient with new sciences, because philosophically-minded scientists and scientifically minded philosophers are often enthusiastic and draw conclusions that go far ahead of their premises.

In this paper, I will examine some important metaphysical lessons that are often presented as derived from two new scientific disciplines: synthetic biology and neuroscience. As we will see, many caveats are in order, and each 'advance' or each case should be assessed for itself. I will analyse four of them: the nature of life, the existence of a soul (the mind-body problem), personhood, and free will. The first comes under the jurisdiction of synthetic biology, whereas the others are linked with neuroscience.

2. The nature of life

After the Craig Venter Institute successfully transplanted the *Mycoplasma micoides* genome in *Mycoplama capricolum* in March 2010, Roberta Kwok said that 'the team has fielded criticism for calling the resulting cell "synthetic" when the genome was essentially a replica of a natural genome and required an existing recipient cell. Hutchison [a member of Venter's team] argues that "synthetic" simply means "chemically synthesized", not newly designed' [4, p. 25]. Words matter and using expressions like 'synthetic' instead of 'replicated' is not without symbolic and philosophical impact. Another expression used, 'newly designed', also has connotations of its own. To design is not exactly the same as to create, but it is not very far away, and creation refers to a godlike action. Playing God or adopting a demiurgic stance are objections often voiced against biotechnologies by certain opponents. Even people not committed to a particular worldview are using expressions with a theological tone in relation to synthetic biology. For instance, contrasting two ways of producing artificial living beings, one consisting of modifying the genome of existing beings and another consisting of building them from inanimate molecules, Joachim Boldt and Oliver Müller speak of 'creation *ex existendo*' and 'creation *ex nihilo*' [5, p. 388].

Theological expressions and hints abounded at the time of the Craig Venter Institute's success, and the Vatican was not the last to deny that the transplantation was a genuine creation. In the *Wall Street Journal* we find an echo of the debate, in a paper written by James DeGiulio [6], where we read quotes from *L'Osservatore Romano*, the official newspaper of the Vatican, saying that the transplantation was not life's creation, because DNA is only an engine in the service of life and not life itself. Therefore, through the transplantation, Venter's team has merely 'replaced one [of the] motors' of life. Craig Venter was nevertheless of the same mind and in another paper published in the same newspaper, co-authored with Daniel Gibson [7], he wrote: 'Kornberg did not create life in a test tube, nor did we create life from scratch. We transformed existing life into new life. We also did not design and build a new chromosome from nothing. Rather, using only digitized information, we synthesized a modified version of the naturally occurring *Mycoplasma mycoides* genome. The result is not an "artificial" life form.' (Arthur Kornberg was the first scientist who duplicated the DNA of a virus, in 1967) The words used could be misleading: strictly speaking, no human being is able and will ever be able to build a chromosome *from nothing* or to create life *from scratch* – only a God could do it. But maybe in the future a human being will be able to build a chromosome *from inorganic molecules* or to create life *from non-living elements*?

What does it mean for an organism to live? And what is required from scientists in order to create a living organism? For centuries, life has been tied with some special principle, material or not. For animism, a being is living if it possesses a non-material soul: a dualistic approach; for vitalism, it must have inside itself a principle of life, reducible to matter or not [8, (pp. 12–14)]. In an age of Darwinism, no scientist still accepts such views; they are non-scientific and if science has a metaphysical impact, they constitute metaphysical mistakes. For instance, 'No non-physical substance or force is distinctive of all instances of life', says Mark Bedau [9, p. 334]. Life is now considered as emerging or supervening from inanimate matter, through a long process of changes resulting in the advent of new properties, that exactly constitutes life. What is on the list of these properties is still in debate, but the ones most often mentioned are auto-organization, autonomy, capacity to adapt, reproduction, growth, evolution, and metabolism. The debate extends to the question whether these properties are each necessary or not, and if some of them are sufficient or not. Here, I have no need to acquire a firm opinion on this debate. It suffices for me that all the people involved in it accept the same basic assumption: life is an emergent phenomenon and is characterised by a set of properties; therefore, a living organism is a being that possesses some definite properties.