

A NEED FOR HOLISTIC SPECTACLES

Comments on “Conceptual Challenges to Evolutionary Biology: a Necessary Step” by Saniotis and Henneberg

Georges CHAPOUTHIER¹

ABSTRACT. *Saniotis and Henneberg are quite right in their criticism of the traditional neo-Darwinian approach to evolutionary processes. The more holistic approach needed, and which they are advocating, should not, however, completely eliminate the usefulness of reductionist concepts as a first and limited step in analysing more complex processes.*

KEYWORDS: *holism, reductionism, Thomas Kuhn, epigenetic actions*

This very interesting article, written in a wonderfully clear language, critically examines the philosophical problems underlying the modern neo-Darwinian approach to evolutionary processes. The authors show that the approach, derives from the original ideas of Wallace and Darwin, focused mainly on the role of natural selection, and is therefore based on Platonic essentialist concepts, i.e. “ideal entities that underlie the appearance of real objects.” Such is i.e. the concept of “species” in the modern sense, as proposed by Ernst Mayr, meaning a “collection of interbreeding individuals”; but it is still a “static picture of biodiversity” related to Platonic essentialism and unable to take into account the dynamics of individual variations which are the motor of evolution. The concept of “a number of individual organisms similar to each other more than they are similar to other organisms” proposed by the authors as a “similum” seems to be a more appropriate basis for the study of the dynamics of evolutionary processes.

The authors add that such a Platonic approach leads to “biological reductionism” and might make people believe that “living entities can be reduced and understood according to their constitutive parts”, whereas, as the authors argue and as Aristotle proposed, an entity is “*more* than the sum total of its parts”: “emergent properties of entities cannot be entirely explained at molecular and cellular levels of organisation.” Thus the authors suggest a more holistic approach, a cybernetic approach “comprising of complex and irreducible feedback systems and cycles between organisms and their environments.” This includes emphasis on the plasticity and self-organisation processes of biological systems, on the “the gene/environment interplay” as well as probably occasional “Lamarckian inheritance in the inter-generational transmission of acquired traits.” (It may be recalled here that, contrary to

¹The National Center for Scientific Research, Paris, France.

modern neo-Darwinian stances, Darwin himself was a Lamarckian, believing in the heredity of acquired traits.) All this finally leads to an “epigenetic re-formulation of evolutionary biology”, including cultural influences.

As both a neurobiologist and a philosopher, I personally agree with most of the theses put forth by the authors, and I am not the only one. All modern biology emphasizes the need to strongly balance the (reductionist) action of genes by more plastic epigenetic actions. Looking at cultural influences, it could be added that cultural processes which are so important for *Homo sapiens*, as noted in the article, could also be involved in the case of some (other) animals, as more and more cultural and novel adaptive strategies are being discovered in animal behaviour, in vertebrates and even in cephalopod molluscs. The role of natural selection for many authors, e.g. Stephen Jay Gould (2002), cannot explain everything, although they do acknowledge the importance of the process in evolution. In a number of my articles and books (Chapouthier, 2009, 2012), I have presented a theory of biological complexity in “mosaic” formation governed by two universal principles leading to the emergence of biological systems: “juxtaposition” of similar units and subsequent “integration” of the units into more complex emergent structures. The second stage, integration, clearly involves plasticity and self-organisation as described by Saniotis and Henneberg. The authors are right when they claim that “the rise of systems and epigenetic approaches is presently challenging long held assertions of Platonic essentialism and biological reductionism within evolutionary biology.”

While I agree with the interesting approach they have adopted, one which fits in perfectly with the development of modern biology moving to more epigenetic considerations and more holistic, systemic views, I would like to point out that, contrary to the stance developed by Thomas Kuhn (1962) and his “scientific revolutions”, I do not believe that one new theory completely erases the concepts of the preceding one. Einsteinian physics still has scope for Newtonian physics; and while the Copernican view of the cosmos and its mechanisms is better, Ptolemy’s observations of the sun rising and setting still have meaning from our limited earth-centred perspective. So while I may venture enthusiastic support for Saniotis and Henneberg’s holistic approach, I would maintain that reductionism has a useful role to play as a first and limited step in analysing more complex processes.

As Saniotis and Henneberg observed, Platonic essentialism and biological reductionism may have led us to see evolutionary biological processes with “scientific myopia”, but, as in daily life, myopia can still offer approximate knowledge of the world; and, as suggested by Saniotis and Henneberg, scientific myopia in evolutionary biology can be alleviated by holistic lenses!

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