The theory-constructive function of metaphors in biology

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There is no broad agreement concerning the nature of metaphors and such as their relation to literal speech, their scientific significance etc. The perspective offered here follows H.-G. Gadamer in claiming that metaphorical speech is constitutive of literal speech and meaning, M. Black that in metaphorical speech meaning - and at times new cognitions - is created through an interaction between terms literally belonging to different semantic areas (like in "man is a wolf"). In line with Black, M. Hesse, R. Harré, R. Boyd, T. Kuhn and others argue that (besides other roles in science) metaphors are indispensable in the construction of new theories/theoretical models. Harré in particular (partly in collaboration with R. Aronson and E. Way) stress that the theoretical potency of metaphorical statements at the time of theory construction (take Young's "light is wave motion (in some medium)" in 1801) is in the exploitation of (hypothetical) similarities between well-known objects (at the time: the established knowledge in water wave dynamics) and the (more) unknown object of investigation (light). Most importantly (in our context), "similarity" is not taken to be a primitive ("not further grounded") term, but is thought to consist in similarities between causal powers (capacities/dispositions), in their turn manifesting some inherent structural similarity.

But in the perspective of a dynamical ontology, taking nature to consist in "things" interacting with each other according to their capacities or dispositions (through knowledge of which they are also classified), also *human beings* have a place among the things interacting. Human beings interact with each other and other things according to their acquired that is culturally modified natural capacities, as for example in theoretical reflection/experimental intervention. A theory of how metaphorically mediated theoretical models constitute or regulate theoretical and experimental practice will be presented, essentially based on how forms of thinking and action in relation to things of a kind are intimately related to our dispositional knowledge of them. This will be demonstrated by examples (such as Young's double slit experiment, based on his wave model of light).

It will be demonstrated how this line of action-oriented or pragmatist thinking about the theoretical significance of metaphors makes it possible (against Davidson's view on metaphors, for example) to evaluate metaphors in science (as more or less "good" or "fruitful", even "true"). Essentially, a good model will make hypothetically presupposed, causal dispositions/powers appear experimentally. But one must be aware of the fact that even if certain metaphors initially may be "productive", they may (according to their *specific* regulative or constitutive function) in due time, typically when integrated into literal speech, no less *suppress* more adequate knowledge gathering.

The pragmatist view of scientific metaphors indicated here is elaborated through historical studies of physics. Biological entities are essentially very complex. On the other hand, progress in biology can no less than physics do without metaphorical import of theories/concepts/models, what the history of biology from Darwin and on demonstrates at full (E. Fox Keller). In the light of recent philosophical debates relating to the developmental systems theory (S. Oyama, K. Sterelny, P. E. Griffiths, L. Moss) and genomics (B. Barnes, J. Dupré) I want to discuss the legitimacy in particular of certain metaphors in biology (actually re-awakened from literal speech as metaphors through this debate), like "genetic

information", (Darwin's) "tree of life", and more specifically with a view to their actual and possible function as regulative models in a causally complex biological reality. I shall add that I do not believe in a genuinely universal theory of metaphors that covers all possible contexts in which metaphors are used (poetic, scientific etc.). It may be the case that the complexity of biological entities itself demands a specific "theory of biological metaphors".