The spiral, the circle and the microbe: heredity and biological practise

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If you look at a textbook depiction of a lifecycle, let's say a frog's, one element leaps out: the egg develops in a tadpole, the tadpole metamorphoses into a frog and then *the frog turns into an egg again*. Of course, the frog actually *lays* an egg. An organism's life cycle is not a depiction of the life of an organism, it provides a generalisation of what phenotypic states to expect from a certain group of reproducing organisms and the causal connections between these states. Even as such this depiction is flawed: a life cycle can neither depict change through time, nor evolution. To include the possibility of change, we should minimally depict a spiral, not a circle. Incorporating *evolutionary* change is yet another matter, since this requires demonstrating a *cause* for the change.

Biology often turns to heredity as a necessary condition for evolutionary change. Yet heredity itself does not have more explicative power than the spiral described above: it allows one to trace change through time, but it does not give any information on the causes of this change. If our depictions of organismal change through life cycles do not explain the evolutionary process, what information do they convey? I suggest that by assuming idealised states of evolutionary individuality, biologists create a crutch for more sophisticated evolutionary models. How does this crutch support? Individuality is a starting point for concepts such as 'change' and 'causality' in evolutionary biology. Once biologists manage to characterise their study subjects, they can measure 'neutral' change with respect to this characterisation, after which they can measure deviations from this expectation, from which inferring causation becomes possible and herewith the reconstruction of evolutionary trajectories.

However, with less intuitive organisms, such as microbes, this strategy fails. Our sense of microbe individuality is much less precise. As a consequence, terms that are dependent on this conceptualisation, such as heredity and evolutionary causation, also become ambiguous. To face this ambiguity, in biological practise one strategy is the application of local instead of a global metaphysics. I will give an example of this practise in microbial ecology, in which the interpretation of the term 'heredity' and the epistemic requirements for demonstrating evolutionary causation are dependent on different conceptualisations of microbes. This local disambiguation in key evolutionary terminology is certainly confusing. However, in some ways it might actually provide biologists more leeway for conceptual advances: to choose to represent with a circle or a spiral.