

Getting Real: The Hypothesis of Organic Fossil Origins

P. Kyle Stanford

Department of Logic and Philosophy of Science

University of California, Irvine

Abstract

Whether we conceive of it as a process of conjecture and refutation, abduction, inference to the best explanation, or in some other way, it seems clear that much of theoretical science proceeds in an essentially comparative or eliminative manner, choosing from among candidate hypotheses the one best supported by the evidence as that in which our credence will be invested. In recent work I have argued that such eliminative forms of reasoning and justification leave even our best scientific theories open to the challenge that there may well be alternatives to them that remain presently unconceived but are nonetheless equally or even better confirmed by the evidence available to us. Moreover, I suggest that the historical record of scientific inquiry itself should convince us that this most likely represents our actual epistemic predicament in science, for throughout that history we have repeatedly and reliably found ourselves unable to even conceive of particular alternatives to accepted theories that were nonetheless equally well-confirmed by the available evidence and that would ultimately be discovered and embraced by later scientific communities. In this paper I hope to at least begin to explore when this “problem of unconceived alternatives” does and does not pose a serious challenge to belief in the claims of our best theoretical science by considering an especially revealing biological example: the hypothesis that fossils are the remains of once-living organisms.

For most of modern scientific history, I suggest, this claim was no more than a theoretical hypothesis vulnerable to the problem of unconceived alternatives, but it is now a secure item of scientific knowledge no longer subject to any serious challenge on this basis. I argue, however, that this change has not come about through the simple accumulation of more and stronger eliminative evidence in support of this hypothesis, but instead through the accumulation of evidence of a distinctive sort: our primary support for the hypothesis of the organic fossil origins is no longer fundamentally abductive or eliminative in character, but instead consists in a kind of inductive projection. We are able to directly observe and reproduce, in the field and in the lab, the very same processes that we take to have produced fossils from organic remains in past environments. We know the details of each of the various steps by which fossils are produced from organic remains in the present, and we are simply projecting the operation of that same causal processes back into the distant past. I go on to discuss various ways in which this can and cannot be distinguished from more characteristically hypothetico-deductive forms of confirmation, and to draw several lessons from this case for disputes about scientific realism more generally. Perhaps most interesting is the moral that the prospects for scientific realism appear considerably better in so-called “historical” sciences like geology and evolutionary biology, for it is surely in these sciences that we can most frequently gather evidence of this projective variety and thereby blunt the force of the challenge posed by unconceived alternative theoretical possibilities.