Abstracts

Denis Walsh: "**The Developmental Imperative**"

The metaphor of the genetic program guided the growth of molecular and developmental genetics throughout the 20th century. Yet it has repeatedly come under critical scrutiny in our own century. I argue that recent attempts to undermine the metaphor fail, because they do not correctly identify its persuasive power. I argue that what makes computer programs such a (putatively) apt metaphor for gene action, is that (allegedly) both genes and programs have imperative (‘directive’) illocutionary force. I employ informational theories of natural meaning to pose the question whether genes really do have ‘directive’ illocutionary force. Recent research in developmental genetics, and in particular in epigenetics, suggests that generally they do not.

James Ladyman: **"What if anything is fundamental about physics?"**

Some say everything is physical while others regard physics as just one among the special sciences. Given that not all of physics is fundamental physics, and that there are many notions of fundamentality, it is not obvious what is fundamental if anything about physics in general. Moreover, it is widely assumed that reductionist programmes have failed and that the special sciences are autonomous. On the other hand, there is now quantum biology, quantum chemistry and even econo-physics suggesting that a lot is still expected of physics. In this paper I argue that physics is not just one among the sciences and clarify in what senses is it and is not fundamental.

Patricia Palacios: **"Intertheoretic Reduction in Physics Beyond the Nagelian Model"**

Intertheoretic reductions play an important role in modern physics. But under what conditions a theory reduces to another, and what is achieved by reduction? Nagel (1961) famously attempted to offer a general structure of scientific reduction, whereby reduction is understood in terms of the logical deduction of the reduced theory from the union of the reducing theory and bridge laws. Despite its limitations, the Nagelian model, and revised versions of it, continues nowadays being regarded as the standard philosophical model of reduction in physics. In contrast to this view, I will argue that the Nagelian model does not suffice to explain the most important examples of reduction in physics, including the alleged reduction of thermodynamics to statistical mechanics. Thus, I will contend that in order to have a better understanding of reduction one needs to consider alternative approaches to reduction that emphasize the role of limits and approximations as well as the structural connection between the theories to be compared.

Axel Gelfert: **"Explanation and Exploration in the Science of Pattern Formation"**

Patterns – from the ripples in the sand to the stripes of a zebra – are among the most salient phenomena in nature, attracting attention from scientists and laypersons alike. Yet, until recently, the various processes and attempted explanations of pattern formation have scarcely been discussed by philosophers of science. While part of the reason may have to do with disciplinary structures preventing an overarching 'science of pattern formation' from emerging, this should not preclude a philosophical discussion of the very real interplay between various types of explanation, modeling, and exploration in such cases. The present paper draws on recent work (e.g. Bokulich 2018, Gelfert 2018) discussing prominent examples, and attempted explanations, of pattern formation across the sciences. One such case study concerns the varied career of reaction-diffusion models in the study of biological pattern formation, which was initiated by Alan Turing in a classic 1952 paper. Initially regarded as mathematically elegant, but biologically irrelevant, demonstrations of how, in principle, spontaneous pattern formation could occur in an organism, such Turing models have only recently rebounded, thanks to advances in experimental techniques and computational methods. The long-delayed vindication of Turing's initial model, it is argued, is best explained by recognizing it as an exploratory tool (rather than as a purported representation of an actual target system).

Laura Franklin-Hall: **"Why are some kinds historical and others not?"**

This paper explores why scientists sometimes classify entities in terms of their histories, and other times based exclusively on their non-historical or 'synchronic' properties. After reviewing examples of these two approaches, I formulate a principle designed to both describe and explain this aspect of our scientific classificatory practice. According to this proposal, a domain is apt for historical classifications just when the probability of the independent emergence of similar entities

(PIES) in that domain is very low. In addition to rationalizing this principle and showing its ability to correctly account for classification practices across the natural and social sciences, I consider whether the kinds so circumscribed will be objective or real.