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Fundamental issues in systems biology

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Abstract

In the context of scientists' reflections on genomics, we examine some fundamental issues in the emerging postgenomic discipline of systems biology. Systems biology is best understood as consisting of two streams. One, which we shall call 'pragmatic systems biology', emphasises large-scale molecular interactions; the other, which we shall refer to as 'systems-theoretic biology', emphasises system principles. Both are committed to mathematical modelling, and both lack a clear account of what biological systems are. We discuss the underlying issues in identifying systems and how causality operates at different levels of organisation. We suggest that resolving such basic problems is a key task for successful systems biology, and that philosophers could contribute to its realisation. We conclude with an argument for more sociologically informed collaboration between scientists and philosophers.

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