

# Causes that Make a Difference

Waters, C. Kenneth (2007) Causes that Make a Difference.

Full text available as:

[PDF](#) - Requires a viewer, such as [Adobe Acrobat Reader](#) or other PDF viewer.

## Abstract

Biologists studying complex causal systems typically identify some factors as causes and treat other factors as background conditions. For example, when geneticists explain biological phenomena, they often foreground genes and relegate the cellular milieu to the background. But factors in the milieu are as causally necessary as genes for the production of phenotypic traits, even traits at the molecular level such as amino acid sequences. Gene-centered biology has been criticized on the grounds that because there is parity among causes, the “privileging” of genes reflects a reductionist bias, not an ontological difference. The idea that there is an ontological parity among causes is related to a philosophical puzzle identified by John Stuart Mill: what, other than our interests or biases, could possibly justify identifying some causes as the actual or operative ones, and other causes as mere background? The aim of this paper is to solve this conceptual puzzle and to explain why there is not an ontological parity among genes and the other factors. It turns out that solving this puzzle helps answer a seemingly unrelated philosophical question: what kind of causal generality matters in biology?

**Keywords:** cause, laws of nature, scientific laws, causal, difference maker, specificity, sensitivity, gene, DNA, parity, Mill's problem, DST, developmental systems theory

[Specific Sciences: Biology: Molecular Biology/Genetics](#)

**Subjects:**

[Specific Sciences: Biology](#)

[General Issues: Causation](#)

[General Issues: Reductionism/Holism](#)

**ID Code:** 3833

**Deposited**

**By:**

[Waters, C. Kenneth](#)

**Deposited**

**On:**

24 January 2008