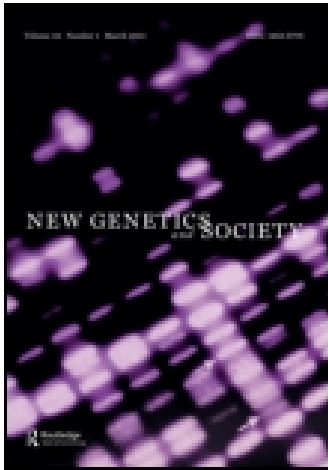


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New Genetics and Society

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/cngs20>

Genetics and philosophy

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Published online: 16 Aug 2013.

To cite this article: Maurizio Meloni (2013) Genetics and philosophy, *New Genetics and Society*, 32:3, 330-332, DOI: [10.1080/14636778.2013.824249](https://doi.org/10.1080/14636778.2013.824249)

To link to this article: <http://dx.doi.org/10.1080/14636778.2013.824249>

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America, with some thoughtful musings about possible futures in the final chapter. Although for the most part a satisfying account, for me, probably because of my perspective as a UK genetic counselor, there were some aspects of that history that were tantalizingly left out. I would have liked to learn more about the “bitter divorce” mentioned but not expanded upon in Chapter 1, when the American Board of Medical Genetics excluded master’s level genetic counselors from their purview. I also would have liked to read more about the development of the American Board of Genetic Counseling, barely mentioned at all. However, these are small shortcomings in what is a compelling account of the growth of a profession named by the *Huffington Post* in 2012 as “one of the seven coolest jobs you’ve never heard of”!

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<http://dx.doi.org/10.1080/14636778.2013.808420>

Genetics and philosophy, by Paul Griffiths and Karola Stotz, Cambridge/New York, Cambridge University Press, 2013, 270 pp., £16.99 (paperback), ISBN 978-0-521-17390-2

Twentieth century biology has been dominated by the gene, not only as a central entity in the life-sciences and biomedicine, but also as a powerful “cultural icon” (Nelkin and Lindee 2004). The century that just ended has been rightly named as “the Century of the Gene” (Fox Keller 2002). However, will this still be the case for the present one? On the 60th anniversary of the discovery of the double-helical structure of DNA and the 10th anniversary of the decipherment of the human genome, a number of postgenomic developments have emerged that may undermine this centrality of the gene. *Genetics and Philosophy*, by philosophers of science Paul Griffiths and Karola Stotz is probably the most accomplished illustration of this new “postgenomic” understanding of biological processes that promises to challenge the conventional “gene-centric” language of twentieth century biology. As Griffiths and Stotz write at the very beginning of the book:

in the “postgenomic era,” when complete genome sequences are available for an increasing range of organisms, the range of molecular actors has expanded greatly. The genome is not merely a collection of genes, but houses diverse other functional elements. Genes no longer have a single function closely related to their structure, but

respond in a flexible manner to signals from a massive regulatory architecture that is, increasingly, the real focus of research in “genetics.” (2013, 2)

“Molecular epigenetics,” the existence of mechanisms around and above the level of the gene that, without changing the DNA sequence itself, alter the activations and expressions of the genome (for instance, methylation), is probably the most well-known illustration of this novel postgenomic knowledge: not by chance, a picture showing the inactivation of a DNA sequence dominates the cover of the book. Griffiths and Stotz are brilliant in showing how an emphasis on epigenetics is far from being just an eccentric or marginal case in biology, but brings with itself the germs of a whole rereading of the Modern Synthesis in evolutionary thinking. The fact is that epigenetics and other cases of external gene regulation open the way for an understanding of how “the regulatory architecture of the genome extends outside the organism” (Griffiths and Stotz 2013, 6).

The appropriate level for integrating all these external regulatory influences of the genome is “the developmental niche”: in the words of Griffiths and Stotz this is “the set of environmental and social legacies that make possible the regulated expression of the genome during the life cycle of the organism” (110). Taking seriously the idea of a developmental niche as the proper integrative framework for extended inheritance mechanisms means understanding that environmental factors also “carry information in development” (Griffiths and Stotz 2013, 197) and that “sequence specificity or Crick information” as Griffiths and Stotz call it, “is not contained solely in nucleic acid sequence”: “the idea of the DNA sequence as the sole source of specificity does not seem to capture how complex organisms are regulated and organized” (84). From a new understanding of the regulatory mechanisms of genome expression and their porosity to external factors (the “reactive genome,” as Griffiths and Stotz call it in Chapter 4), a broader appreciation rises of how “the common oppositions between nature and nurture, innate and acquired, biology and environment” is today totally meaningless. To the extent that genes “are defined by their broader context”, as Griffiths and Stotz conclude, “a more epigenetic understanding of nature together with a more mechanistic understanding of nurture renders many of the old dichotomies blurred or entirely incoherent” (228).

However, this book is far from being only a conceptual manifesto for a new postgenomic epistemology. It is also a very accurate intellectual history of how the different identities of the gene – the Mendelian allele, the material unit of heredity, the molecular unit of Crick information and today the postgenomic gene – have accumulated and co-existed over history. More than theoretical entities, all these identities have been the result of the experimental settings and practices in which the gene in its multiform vest has been anchored and operationalized: “the concept of the gene”, Griffiths and Stotz claim, “is therefore best thought of as a set of contextually activated representations” (221).

For social scientists, in particular, the book is highly recommendable and, of course, open to challenges and criticisms. Epigenetics and the existence of “exogenetic inheritance” is most definitely an exciting case of study for social scientists but it is not alien to problematic interpretations and critiques. As Griffiths and Stotz themselves note (although it is not their aim to support a reductionist strategy, quite the opposite), with the rise of epigenetics, “much of the new science of nurture adopts a reductionistic research strategy, tracking both the process of nurture and its effects down to the molecular level” (228). Authors in the social sciences have already started to map this, and some of them have expressed concern for a new reductionist gaze taking shape. Sarah Shostak, Hannah Landecker, and Joerg Niewoehner have spoken, respectively, of the molecularization of the body, of the environment, and of biographies, milieu and social position. These notions have already started to circulate, and there is reason to believe that the molecular juncture of nature and nurture that epigenetics represents will become, in the next few years, the new frontier of the social studies of the life-sciences.

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<http://dx.doi.org/10.1080/14636778.2013.824249>