

Foreword

This issue of *Journal of Biosciences* is based on the talks given at a discussion meeting on the theme of Genetic Determinism which was held in Pelling, Sikkim, in December 2003.

The basis of our understanding of the relation between genes and organisms – or between genotype and phenotype – is a long-standing issue in biology; it has been thrown into focus by recent advances in our ability to manipulate genetic material. An attractively straightforward view is based on what one might call genetic determinism. It holds that our phenotypes are, in effect, what our genes say they are. To begin with, phenotypes are considered capable of being partitioned. Each gene ‘causes’ or ‘is responsible for’ a particular part of the phenotype. A mutation in one gene would have an effect that can be looked at separately, from the effect of a mutation in some other gene. This view has been challenged as being simplistic, but how wrong is it? How good is the evidence that single gene changes lead to unitary changes in the phenotype with negligible attendant consequences? What are the implications of viewing living organisms as being in some sense specified by their genes – as opposed to being endowed with a fair degree of plasticity, morphological, behavioural and otherwise? Admittedly the two points of view are not entirely in opposition; to suggest otherwise would be to set up a straw man. But the fact of the matter is that the perennially fashionable notion of genetic determination lays stress on the former. It is this emphasis on one point of view that the Pelling meeting was designed to question. The following paragraph expresses our aims at the time we put together the meeting.

“We wish to examine critically the gene-based philosophy that rules modern biology and medicine. For more than a century, the word ‘gene’ has held out the promise of making concrete, even permanent, the ephemeral qualities of life. The meeting will explore the concept of a gene in its various dimensions: historical, philosophical, social, ethical and scientific. It will highlight instances in which the reach of a given notion of the gene began to exceed its grasp. The meeting will begin with a historical presentation of the context in which the idea of the gene first arose and was later incorporated into mainstream biological science. This will be followed by a review of the early modern notion of the molecular gene and its modifications following the discoveries of splicing, alternative splicing, epigenetic inheritance and paramutation. An examination of non-genetic influences on the phenotype will lead to critical presentations on the conceptual framework behind the genetic manipulation of crop plants, animals and, potentially, humans. The meaning of and impulses towards genetic reductionism and determinism will be explored. The meeting will finally focus on the bio-ethical, social and geopolitical implications of ongoing and proposed applications, wise and unwise, of the new genetic technologies”.

As the articles in this issue show, what turned out was slightly different. Some speakers did subject the notion of genetic determinism to explicit and critical scrutiny; others (in particular the linguists) touched on it indirectly; and yet others spoke in support of the research strategy that advocates looking for single gene mutations that are strongly correlated with striking, ‘single’, effects on the phenotype. Unfortunately, not all those who spoke at the meeting are represented here. On the other hand, some of those who should have been in Pelling but were unable to make it, kindly provided written versions of the themes that they intended to discuss. An interesting presentation by Mathias Külpmann on the implications of modern biotechnology for national economies is being published in a separate issue of this journal as a Commentary. Minakshi Bhardwaj spoke on ethical issues underlying biotechnology, and it is hoped that her contribution too will appear separately.

The papers have been grouped in the following sequence, chosen to reflect the main themes: History (Keller), Genes and Development (Gurdon; Vyas and Kasbekar; Veitia), Environment and

Plasticity (Bateson; Borges; Sinha; Gilbert), Epigenetics (Newman; Takaki), Cancer (Kotnis, Sarin and Mulherkar; Soto and Sonnenschein) and Language (Shukla; Vasanta; Karanth). Reading them will make clear that broad questions on the role of genes and approaches to addressing them recur across levels and disciplinary boundaries.

The value of the meeting was substantially enhanced by the high quality of discussions, and thanks are due to all the speakers and participants for their keenness. Finally, the meeting would not have been possible but for the generous financial support provided by the Wellcome Trust, the Heinrich-Böll-Stiftung and the US National Science Foundation, and the administrative backing provided by the Indian Academy of Sciences. To all of them we express our immense thanks.

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