Commentary

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Epigenetics and its Perceptions

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Description

Geneticists study the gene; though, for epigeneticists, there is no clear 'epigene'. Nevertheless, throughout the past year, more than 2,500 articles, many scientific meetings were devoted to the subject of epigenetics. It includes some of the most exciting modern biology and is depicted by the current press as a revolutionary new science, an antidote to the indication that we are hard-wired by our genes. There has always been a place in biology for words that have altered meanings for different people. Epigenetics is an extreme case, because it has numerous meanings with independent roots. The study of mitotically or meiotically heritable deviations in gene function cannot be clarified by changes in DNA sequence. These definitions vary markedly, though they are often conflated as they refer to a single phenomenon. Waddington's term incorporates the movement of all developmental biologists who study how gene activity through development causes the phenotype to arise, but it suffers from the disadvantage that evolving biologists themselves rarely, if ever, use this word to describe their field. In this sense, the usage is obsolete.

The molecular basis of heritable epigenetics has been studied in a variability of organisms. The DNA methylation system and the Polycomb or Trithorax systems come closest to the ideal, because alterations in these systems are often inherited by following generations of cells and sometimes organisms. Several studies have stated evidence that links the environment or ageing to long-lasting epigenetic effects on phenotype. One study examined monozygotic which are identical twins, perhaps oddly, epigeneticists often use to demonstrate their system at work. To many, twins epitomize the awesome power of genetics to control human form and function regardless of environment. Indeed, 'concordance' of a specific characteristic in monozygotic as well as dizygotic twins is one of the most reliable ways of assessing its genetic basis. What has attracted the attention of epigeneticists, however, is that monozygotic twins do not always show the same disease susceptibility, raising the possibility that epigenetic differences that arise during ageing are at work.

Conclusion

Epigenetic marks as responsive, not active. In other words, epigenetic systems of this kind would not, under normal conditions, initiate a change of state at a specific locus but would register a change already levied by other events. Such events could be, for example, the impact of DNA with ionizing radiation or an evolving switch in gene expression. It could be contended that the responsive nature of epigenetic procedures is a unifying feature, because classic epigenetic systems such as the DNA methylation system and the Polycomb (or) Trithorax systems seem to retort to previous switches in gene activity in this way. Therefore, their refined feature is the capability, in the 'darkness' of the nucleus, to sense and mark modifications in the chromosomal status. For example, transcriptional activation over sequence-specific DNA-binding proteins carries in histone acetyltransferases, which then epigenetically adapt the promoter region for transcription. Similarly, elongating polymerases carry enzymes that detain the spurious transcriptional initiation that might ascend within the provisionally disrupted chromatin of an active gene. Without such epigenetic mechanisms, the changes in genetic programming could be dissolute and lost; transient disruptions of chromosomal organization might go uncompensated; and DNA injury might escape repair.