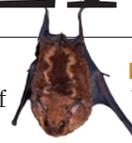


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Life stresses

It is time for sociologists and biologists to bury the hatchet and cooperate to study the effects of environmental stress on how people behave.

In the modern world, 'stress' is too often used as a catch-all word, a vague concept that bundles together a hectic pace of life and the increasing pressures that come with it. To scientists, the fuzzy notion of stress can symbolize the even fuzzier notion of the impact of an environment on an individual — one side of the classic nature-nurture debate.

Francis Galton, cousin of Charles Darwin and promulgator of his evolutionary theory, is credited with first defining the terms in this enduring conflict. "Nature is all that a man brings himself into the world; nurture is every influence which affects him after his birth," he wrote in his 1874 *English Men of Science: Their Nature and Nurture*.

That debate got fiery a century later, when the twentieth-century revolution in biology — which enabled biologists to study development and even behaviour at a molecular level — met the 1968-era social revolution. It pitted those who believed that we are determined only by our genes against those who believed we are determined only by our environment, and ignored those who pointed to the dearth of evidence either way.

Sociologists built a nurture fortress, from which they criticized what they saw as the scientific mainstream's biological determinism. They argued that the unproven and unlikely theory was dangerous because it could lead to social policies based on incorrect assumptions, such as criminals not being reformable and young minds not being vulnerable to stress. In energizing the debate, they did a service to both academia and society by keeping scientific arrogance and influence in check.

Scientists have long since abandoned any concept of biological determinism. It has now been proved beyond doubt that although our genes are fixed, their expression is highly dependent on what our environment throws at us. The current challenge is to work out precisely how environment affects our biological tissues and changes us.

Until now, analysis of the environment has been the domain of social scientists, who have elaborated the correlations between environment and health or behaviour — for example, that a deprived upbringing increases the risk of deviant behaviours in adulthood. Now, biologists are starting to render visible how one aspect of the environment — stress — leaves marks on the body (see page 161). It shortens telomeres and alters epigenetics and brain processing — and it is most potent when it occurs during brain development, a surprisingly long period of time stretching from the third trimester of pregnancy to the end of adolescence. These stress-induced changes increase vulnerability to all sorts of conditions, including psychiatric disorders and antisocial behaviour.

This rendering visible is starting to catch the attention of those who can influence social policy. For example, the influential American Academy of Pediatrics this year published a report on what it calls "toxic stress", which says that poor, or poorly coping, mothers should be cared for better while pregnant (A. S. Garner *et al. Pediatrics* **129**, e224; 2012). Last year a report commissioned by the British government covered similar ground — a development highlighted by Ilina Singh from King's

College London (I. Singh *BioSocieties* **7**, 308–321; 2012). Yet she is one of only a handful of sociologists to notice that a new area of potential collaboration is opening up without their input. Science is indicating that stress damage can occur in the womb, and it is understandable that politicians will look for guidance on what to do about it. But right from the start, that guidance must involve sociologists, who are best placed, for example, to balance the potential benefits of increased monitoring against possible infringement of basic freedoms and rights.

"Only a handful of sociologists are noticing that a new area is opening up without their input."

Many sociologists, however, are still immured in their fortress, struggling to catch up with a debate that has shifted from nature-or-nurture to nature-and-nurture, or are unable to shake off their distrust of scientists, worrying that scientists will force them to play second fiddle in their own territory: the environment. That is a shame: both academia and society still need their engagement at many

levels. Now is a perfect time for a reconciliation of the two cultures.

Funding agencies can play an important part in this. They should be aware of the need for an interdisciplinary approach and encourage their review panels to assess projects with an open mind. Psychologists, too, could offer crucial insight into these efforts, and contribute their experience of how to best to exploit the lessons of neuroscience.

Sociologists have been studying human environments for decades, and have tallied the social damage that stresses such as poverty or child abuse can cause. Biologists are now in a position to benefit from their insights, although they will need to learn the language of sociology. And sociologists stand to benefit from the understanding that biology will bring to their own, vindicated, empirical research. ■

Share alike

To make progress in clinical genomics, institutions must work out how to pass on data.

Many newborn babies admitted to intensive care have genetic disorders. The symptoms can be obvious — uncontrollable seizures, spontaneously peeling skin, abnormal heartbeats — but the cause often remains unknown. That uncertainty has painful ripples: physicians have little knowledge about how to guide treatment and parents are left unsure whether to have further children.

Genome sequencing can help. Using the fastest available sequencing instrument and software designed to guide clinicians through analysis, a team at the Children's Mercy Hospital in Kansas City, Missouri,