

THIS WEEK

EDITORIALS

X FACTORS The global risks we know we don't know about **p.134**

WORLD VIEW Rumour psychology and a tale of two airlines **p.135**



BEHAVIOUR Female Atlantic mollies go for bisexual males **p.136**

No easy answer

Demands to analyse Connecticut school shooter's DNA are misguided and could lead to dangerous stigmatization, or worse.

Connecticut's state medical examiner has requested a full genetic analysis of mass killer Adam Lanza, who shot 20 children, 6 school staff, his mother and himself in Newtown in December. At first glance, it is easy to understand why. Confronted with such senseless violence, it is human nature to seek solace in scientific explanations. After John Wayne Gacy was executed in 1994 for the murder of 33 young men and boys, his brain was preserved and examined for clues to what made him a monster. More than 80 years ago, scientists reportedly studied the brain of serial killer Peter Kürten, the 'vampire of Dusseldorf', who was executed in 1931.

This quest to understand endures as technology advances. Now, instead of looking at cranial folds and frontal lobes for clues to the massacre, geneticists at the University of Connecticut in Farmington will scour Lanza's genes. On its own, this hunt will be about as informative as studies of the brains of murderers: not very.

The Connecticut scientists will not talk about the job they have been handed. It is not clear what they will find, or even what they should look for. Suspend disbelief for a moment and pretend that a 'mass-shooter gene' exists — something that no serious geneticist believes — and scientists could still draw no conclusions from a single individual's genome.

To be sure, many links and suggestions of links have been identified between genetics, mental illness and, to a lesser extent, violence. A study using Swedish registries (R. Kuja-Halkola *et al.* *Dev. Psychopathol.* **24**, 739–753; 2012) found that children born to men older than 60 were more likely to be convicted of violent crimes than were those born to men aged 40–60 years, an observation that might be linked to increasing numbers of mutations in sperm as men age. Genetic risk factors have been identified for autism, depression and schizoid spectrum disorders, but they explain relatively little. People diagnosed with schizoid spectrum disorders are more likely to be convicted of violent crimes than are those with no such diagnosis, but the vast majority of people with mental illness do not commit crimes.

Such associations hold only for groups. Many healthy people carry mutations associated with disease; many people with mental illness carry no known risk factors. Mass shooters are often young white men, yet very few young white men become mass shooters. There is no one-to-one relationship between genetics and mental health or between mental health and violence. Something as simple as a DNA sequence cannot explain anything as complex as behaviour.

But there is a dangerous tendency to oversimplify, especially in the wake of tragedy. If Lanza's DNA reveals genetic variants — as it inevitably will — people who carry similar variants could be stigmatized, even if those variants are associated only with ear shape. If Lanza has genetic variants already associated with autism or depression, people with those diseases could come under suspicion as well.

The real risk here, and the real flaw in the Connecticut exercise, is that to identify a genetic variant is more straightforward — but arguably less informative — than to characterize the complex environment of the

individual. Lanza's DNA will be analysed not because it will be useful but because it can be analysed. The ease of DNA sequencing will lead to a dangerous temptation to focus on minor, even spurious, genetic correlations at the expense of non-genetic factors that are more influential.

Geneticists must explain — and in the wake of the Lanza move many already are — that the ability to sequence DNA is many steps removed from the ability to make that sequence meaningful. Many, if not most, mutations are meaningless outside narrow contexts. One of the most

"This hunt will be about as informative as studies of the brains of murderers: not very."

robust examples of a variant that has been linked to antisocial behaviour holds only for individuals who experience severe childhood trauma or abuse; those who do not face no greater risk of being antisocial than people without the variant. Less-studied risk factors presumably work the

same way. Genetics matters only in the context of environment.

Research must go beyond the drive to unpick impulses to violence. It should consider the means to violence. On the day that Lanza entered Sandy Hook school armed with his mother's guns, another deranged man entered Chenpeng Village school in China's Henan province armed with a knife. Horrifying as that attack was, no one was killed. Yet research on how to reduce gun violence in the United States has been hampered by pro-gun lobbyists and politicians, who have reduced the necessary funding and record-keeping for preventing injuries from firearms.

Sequencing Lanza's DNA may bring benefits, but only if appropriate expectations are maintained. At best, such studies will prompt deeper interest and funding to figure out the biological and social factors that really harm. At worst, they will stigmatize those with mental illnesses and distract scientists from more-important questions. ■

Culture shock

Health-benefit claims for Europe's foods must at last be substantiated by science.

Will a daily probiotic yogurt improve your immune defences? And will cooking with olive oil boost the levels of 'good' cholesterol in your blood?

So far, the food companies behind these particular claims have not supplied the hard scientific evidence to convince expert committees of the European Food Safety Authority (EFSA) in Parma, Italy, that they are warranted. European Union (EU) legislation means that all similarly unsubstantiated health claims for food will soon be disallowed. A register of permissible claims — which will be regularly updated