

## Novels help to uphold social order

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WHY does storytelling endure across time and cultures? Perhaps the answer lies in our evolutionary roots. A study of the way that people respond to Victorian literature hints that novels act as a social glue, reinforcing the types of behaviour that benefit society.

Literature “could continually condition society so that we fight against base impulses and work in a cooperative way”, says Jonathan Gottschall of Washington and Jefferson College, Pennsylvania.

Gottschall and co-author Joseph Carroll at the University of Missouri, St Louis, study how Darwin’s theories of evolution apply to literature. Along with John Johnson, an evolutionary psychologist at Pennsylvania State University in DuBois, the researchers asked 500 people to fill in a questionnaire about 200 classic Victorian novels. The respondents were asked to define characters as protagonists or

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antagonists, and then to describe their personality and motives, such as whether they were conscientious or power-hungry.

The team found that the characters fell into groups that mirrored the egalitarian dynamics of hunter-gatherer society, in which individual dominance is suppressed for the greater good (*Evolutionary Psychology*, vol 4, p 716). Protagonists, such as Elizabeth Bennett in Jane Austen’s *Pride and Prejudice*, for example, scored highly on conscientiousness and nurturing, while antagonists like

Bram Stoker’s Count Dracula scored highly on status-seeking and social dominance.

In the novels, dominant behaviour is “powerfully stigmatised”, says Gottschall. “Bad guys and girls are just dominance machines; they are obsessed with getting ahead, they rarely have pro-social behaviours.”

While few in today’s world live in hunter-gatherer societies, “the political dynamic at work in these novels, the basic opposition between communitarianism and dominance behaviour, is a universal theme”, says Carroll. Christopher Boehm, a cultural anthropologist whose work Carroll acknowledges was an important influence on the study,

agrees. “Modern democracies, with their formal checks and balances, are carrying forward an egalitarian ideal.”

A few characters were judged to be both good and bad, such as Heathcliff in Emily Brontë’s *Wuthering Heights* or Austen’s Mr Darcy. “They reveal the pressure being exercised on maintaining the total social order,” says Carroll.

Boehm and Carroll believe novels have the same effect as the cautionary tales told in older societies. “Just as hunter-gatherers talk of cheating and bullying as a way of staying keyed to the goal that the bad guys must not win, novels key us to the same issues,” says Boehm. “They have a function that continues to contribute to the quality and structure of group life.”

“Maybe storytelling – from TV to folk tales – actually serves some specific evolutionary function,” says Gottschall. “They’re not just by-products of evolutionary adaptation.” ●

## Starving bacteria bumped up early Earth’s oxygen

HUNGRY nickel-grabbing bacteria could be to thank for the surge in atmospheric oxygen 2.5 billion years ago that made Earth hospitable to life.

Stefan Lalonde of the University of Alberta in Edmonton, Canada, and colleagues measured the concentration of nickel deposited in layered sedimentary rocks, or “banded iron formations”. They found that levels had dropped by two-thirds in the 200 million years prior to the “Great Oxygenation Event”.

The team speculate that this drop in nickel starved primordial ocean-dwelling bacteria called methanogens that used dissolved nickel in seawater to help turn food into energy and methane. As methane reacts with oxygen to remove it from the atmosphere, a decline in the methane produced by bacteria would have led to a build-up of oxygen.

Though it is not clear quite how much the ancient bacteria relied on the metal, “growing modern methanogens in the lab requires extremely high concentrations of nickel”, says Stephen Zinder at Cornell University in Ithaca, New York.

So what could have caused the nickel shortage? A surge in the number of magma plumes just before the nickel decline removed a large amount of heat from Earth’s core, say the team. In these cooler conditions, more oceanic crust was created relative to continental crust. This contains less of the nickel that the bacteria can use. The work was presented at the American Geophysical Union meeting in December.

“This study is one of the first to look at hard data about metal concentrations, which is an important new idea,” says Timothy Lyons of the University of California, Riverside. But he suspects the oxygenation effect may be less than the team thinks, because the bacterial famine could have enabled other atmospheric reactions that used up oxygen. Devin Powell ●



Heathcliff’s personality reflects societal pressures