A SHAKESPEAREAN TRAGEDY?

Othello, spite, and the end of the world.

Recently, I celebrated completing a feature article for *The Scientist* by going to the theatre. After a period of dealing obsessively with one subject - in this case, an enigmatic class of self-destructive social behaviour called spite (1) - it is good to remind oneself that there is a whole wide world out there. Little did I know that Shakespeare's Othello is all about, yes, spite. OK, so it's about lots of other things, too - love, hate, love and hate, race, jealousy, law and morality, for instance - but that night, in my one-track state of mind, it was mostly about spite, in all its nasty, self-destructive glory.

Spite is a tricky enough issue for biologists working on bacteria, wasps and gene frequencies, let alone for playwrights dealing with the intricacies of human social behaviour. Take bacterial suicide-bombing:
Why should an *E. coli* bacterium go to the bother of blowing itself up to release toxins that kill its closest competitors when it kills itself in the process? Part of the answer is that the spiteful gene can proliferate in the martyr's clonal relatives. But it also requires very intense competition on a local scale to allow sufficient benefit to accrue to those kin. Therefore, spite tends to occur in parasitic species, where host resources are limiting, and where the sphere of competition is confined to the host organism rather than the whole population. In the closed world of a host caterpillar, for example, a proportion of the clonal larvae of a little parasitoid wasp named *Copidosoma* develop into sterile soldiers whose sole purpose is to kill less related competitors. As a general rule, as competition becomes more local, altruistic, cooperative tendencies become economically less viable than spiteful ones.

Meanwhile, in *Othello*, our hero's right-hand man, Iago, is jealous of his master's success in life and love alike, and sets about destroying him. He succeeds with bells on. He spreads false rumours about Othello's beloved Desdemona's infidelity and plants evidence to back them up. In a fit of jealous rage, Othello strangles Desdemona, and events go rapidly downhill from there, concluding with the disintegration of civilization, or, at least, with the death of most of the characters, including Iago himself.

Despite the striking similarities between the spiteful strategies of a suicide-bombing bacterium and Iago (and, for that matter, a suicide-bombing terrorist), I would not dream of attempting a sociobiological interpretation of Othello (or terror tactics). As a Shakespeare play demonstrates spectacularly, humans have a unique mix of culture, imagination, language and intellect that dislocates us from our biology, that, in the words of Richard Dawkins, allows us to 'rebel against the tyranny of the selfish replicators.' (2)

That said, certain rules of thumb can be applied to both animal and human society, albeit for different reasons. Experiments by Edinburgh University's Stuart West shows that humans, too, become less cooperative as competition for limited resources becomes more local. (1) This is unlikely to have much to do with changes in gene

frequencies and expression. Rather, it reflects a convergence between biology and culture: when faced with similar economic decisions, human intellect arrives at a similar solution as natural selection does for bacteria.

Whether such experiments advance our understanding of human behaviour is debatable. As Oxford University biologist Angus Buckling, told me, "any sociologist might say, well, it's common sense." Indeed, you don't even have to be a sociologist to recognise that as the competition on a sinking ship for a limited number of places in lifeboats gets increasingly intense, the cry of 'women and children first!' will give way to 'every man for himself!' And you only have to watch the movie *Titanic* to see that the ensuing scramble will result in fewer being saved than had cooperation reigned.

But, whether common sense or not, this relationship between competitive scale and cooperation (or lack of it) has some intriguing implications. What happens, for example, when mankind perceives that we are outgrowing our host?

One of the great things about humans is our capacity to increase the effective size of our host planet as required. Known oil reserves are increasing, not diminishing; as our population has expanded, so has our ability to feed more people. As one commentator puts it, the stone-age did not come to an end because we ran out of stones.(3)

Today, however, we seem to be doubting our ability to continue this process. We are bombarded with scary stories of diminishing resources, be they rainforests, oil, clean air or water. Combine this with fears over population growth, and the take-home message is that there is not enough of anything to go round. All of which chimes with the increasingly popular view of humans as a virus, a plague - as, well, parasites. As agent Smith tells Morpheus in *The Matrix*, “Human beings are a disease, a cancer of this planet. You are a plague.”

Environmentalists would perhaps argue that publicising worst-case scenarios spurs people into action. But the question is: what sort of action will it spur us into? Will it make us more inclined to cooperate to sort out problems, as environmentalists no doubt intend, or will it push us in a different direction - one that is detrimental to our collective survival? Will we be more inclined to use (or refrain from using) resources for selfish (spiteful?) reasons rather than cooperative ones? In which case, is there a self-fulfilling element to those worst-case prophesies?

All this could be seen as just one more thing to worry about. But it is more an argument for not basing our world view on worst-case scenarios. After all, if they turn out to be true, there really isn't much we can do about it. Kyoto will mitigate the effect of climate change by 0.15°C over the next century. Even an immediate cessation in the burning of all fossil fuels will have virtually no impact on a worst-case temperature rise of 6°C over the same period.(3)

Of course, while a reduction in human cooperation would undoubtedly be bad for humans, it might not be such bad news for our host planet. Buckling's experiments show that the virulence of infections of spiteful bacterial strains is lower than for those that aren't busy wiping each other out with chemical warfare. For those sections of the green movement that view humanity as a plague or virus, this might be a welcome prospect. But for those of us who prefer to see *Homo sapiens* as a remarkable species

whose cooperative endeavours have got us through many a tight squeeze in the past, and who are optimistic that, when presented with the best available scientific evidence, we can do the same when faced with the problems that inevitably await us in the future, anything that makes us more like nasty, spiteful, self-destructive Iago is well worth resisting.

REFERENCES

1. S. Blackman, Spite: evolution finally gets nasty, *The Scientist*, December 20, 2004
2. R. Dawkins, *The Selfish Gene*, Oxford University Press, 1976.
3. B. Lomborg, *The Skeptical Environmentalist*, Cambridge University Press, 2001.

Back to interesting yet confusing.