All of us -- from slime mould to MPs -- are born to cheat

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(PhysOrg.com) -- Organisms are genetically programmed to cheat the system and have to be policed to stop them putting their needs ahead of society and thus threatening its survival, say scientists.

University of Manchester researchers have shown that even the most-simple organisms have complex social behaviours. Dr Chris Thompson and Dr Jason Wolf's study of slime moulds has shown that these microscopic organisms - which share many of their genes with humans - respond to competition, trying to get the upper hand with a variety of strategies including cheating. However the shift in behaviour is extremely complex. Individuals can cheat by promoting their own self interest or can coerce others to perform the altruistic act. Ultimately this balance may mean the species - or society - survives.

By illuminating general principles of how organisms cheat, their study could help us understand what drives - and what limits - selfish behaviour such as MPs fiddling their expenses.

Dr Thompson, of the Faculty of Life Sciences, explains: "Using slime mould allows us to look at social behaviour in its most basic form. They are single cell organisms that just divide; there is no experience, their social behaviour is simply genetically controlled.

"However they do work together and we have now shown for the first time they do have a complex social life that involves both cheating and coercion, which ensures the survival of the species. We are now working

to identify the genes behind this.

“Since humans share many of the same genes, they will behave the same way.”

The paper, published in the latest Current Biology (23 July 2009) is the latest in a series that asks: why are organisms social? Why do they cooperate with one another when, according to natural selection, they should not do that? They should be fighting to get ahead.

Dr Thompson adds: “It was one of Darwin’s biggest challenges. If individuals did cheat and put themselves first all the time, the species would collapse.”

In slime mould, some amoeba make spores - thus gaining the reproductive advantage - while others make stalks and die. Making stalks is an altruistic act. So why do some make stalks, even though they do not enjoy the reproductive advantage? The trouble is that if everyone cheats, there would be no stalk, and everyone would suffer because fitness will be reduced.

Dr Thompson says: “This latest paper looks at whether organisms are cheating or just choosing the best strategy. If you use the analogy of two men in a sinking boat, with one man bailing more slowly than the other, it may be that he is cheating and allowing the other to do most of the work. Or it may be that he has a better or equally good strategy as bailing slower allows him to conserve energy and actually bail for a longer time.

“We looked at how slime moulds behaved when alone and found some were making more spores. So they were not cheating after all, they were simply following their chosen strategy.

“However we then looked at how these slime moulds behaved when they

were mixed with others and found that they recognised that they were mixed with foreigners and changed their strategy: they did respond to competition.

“It is amazing how complex their ability is to recognise foreigners and shift their behaviour. Sometimes if one is making more spores then the other will make more spores in what we term self promotion. But if everyone did this, then over time you end up with no stalks - everyone is trying to make themselves better and better and better until it becomes spiteful and bloody minded. If everyone is making more spores and no stalks then the system collapses. You need policing or coercion to stop that happening. Somehow some cells are forced to make stalks.

“Now we want to know how organisms recognise foreigners and how they then force others to do something that benefits the species more than themselves.”

He adds: “Working with slime mould is fantastic. It allows us to look at social behaviour in its most basic form. We can us this to understand how organisms work together and form colonies. For example, with tooth decay is caused by colony forming bacteria, and organisms form biofilms and secrete group products to protect against antibiotics. So our findings have a wide application from the practical - why it can be difficult to stop tooth decay - to bigger issues such as evolution on the planet as we know it.

“People might wonder why bother studying slime mould but it could lead to a greater understanding of human behaviour. We know that human behaviour, at least in part, is influenced by our genes, so studying behaviour at a cellular level can improve our understanding of why some genes are associated with cooperation and others with conflict. Cooperation is a major driving force in evolution and understanding it is a huge challenge in biology. In society, people help each other; they

work together within a social structure for a common good even if that means individual effort or sacrifice. I'm interested in finding out what keeps things fair and how cooperation is stabilized in the face of selfish cheats."

Provided by University of Manchester (news : web)