Why nature's way of avoiding detection is smarter than first appears

January 5 2010

University of Glasgow experts have provided the first empirical demonstration of the benefits of 'masquerading' as distinct from simply avoiding detection.

In a paper published in this week's *Science*, Dr John Skelhorn and Professor Graeme Ruxton of the University's Faculty of Biomedical and Life Sciences (FBLS), explain the advantages insects, birds and other organisms derive from pretending to be inanimate objects common to their habitat.

Animals are often mis-identified as twigs, leaves, bird droppings or stones by predators. They do this, according to lead author Dr Skelhorn, not just so they go undetected and uneaten by predators, but so that they are 'misclassified' as something uninteresting by any predators that do detect them in their natural environment.

"We wanted to find out exactly how prey animals were benefiting from the way they looked," explains Dr Skelhorn.

"It is important to make this separation between detection and mis-classification in order to make different predictions about how masquerade evolved. We can make different predictions about how masquerade evolved if we know whether organisms are simply avoiding detection, or whether they're being misclassified.

"If they're being mis-classified, we can predict that they would benefit from resembling objects in their environment that are quite common, because birds or other predators would be more likely to have have been exposed to the model before they experience the masquerading prey item. In other words, predators only mis-classify prey items as inedible objects if they've experienced those inedible objects before. For instance, if predators have not learned that a stick is not inedible, then they will not avoid things which look like sticks," says Dr Skelhorn.

The 'mis-classification' finding enables scientists to predict a type of frequency-dependent predation, where the more models there are - ie the more twigs in a habitat for instance - the more protection masquerading animals are going to gain.

Professor Ruxton continues: "Mis-classification tells us a lot about how the population dynamics of masquerading prey work, which is important in controlling the population density of these animals if they become too common or if they reach plague proportions. It could also be important in developing conservation strategies if these animals were to become in any way endangered."

The researchers, which included scientists from the University of Liverpool, took a group of domestic chicken chicks, at one day old, and gave some of the group twigs and others no twigs.

Dr Skelhorn goes on: "Another group of chicks we exposed to twigs that had been wrapped with coloured thread, so that they looked visually different, but still kept the same shape and odour as a twig."

The researchers predicted that the group that had experienced twigs should be much less likely to attack caterpillars that resembled twigs than groups of birds that had experienced either no twigs before or twigs that looked 'different'.

"This is exactly what we found - the birds that had had exposure to twigs were much less likely to attack caterpillars that looked like twigs than birds that had never experienced normal-looking twigs before. The chicks were modifying their behaviour which is, generally speaking, to peck at most thing in their habitat. The birds that had experience with twigs had already learned they are inedible so considered it pointless pecking at them because there's no benefit to doing so," explained Professor Ruxton.

More information: To view the paper please see: DOI:10.1126/science.1181931

Provided by University of Glasgow