Why do rock lizards display varied behaviour?

Study provides rare evidence of why animal signals are relevant in nature

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Lizards may perform comical push-ups, head bobs or suddenly transform from a stunning crimson body colour to a paler shade in just a few seconds, but this is no game. A recent study on male rock agamas published in *Frontiers in Ecology and Evolution* shows that such ‘signals’ advertise their quality to prospective mates and competitors.

An animal’s quality or ‘fitness’ – measured by how successfully it obtains mates and reproduces – is an important concept in evolution, showing how well an animal’s ‘strategy’ does in nature. So what do these males do to win females over?

**Multiple signals**

To find out, Shreekant Deodhar and Kavita Isvaran of Bengaluru’s Indian Institute of Science studied all behavioural and physical (changes in body colour) signals displayed by 41 wild male rock agamas throughout the lizards’ lifespan (for around 2.5 years) in Andhra Pradesh’s Rishi Valley. They found that males used multiple signals, including head bobs, push-ups and neck flap extensions. Males often used these traits all at once; the frequency of most of these traits increased with the number of females in the vicinity, suggesting that these signals – directed towards females – are maintained by female choice.

“These behaviours may help females judge a male’s quality quickly and more accurately,” says lead author Deodhar. “It is often [energetically] costly to display all these signals together, and if a male does this, it can indicate his quality.”

But there are costs to such flamboyance: it attracts predators and fellow competitors. The scientists found that most of these displays reduced in the presence of predators, proving that predation risk too played a role in the use of signals. Some colour-changing traits could be aimed at multiple receivers including competitors, but detailed experimental studies would be necessary to understand this better, says Isvaran.

**Rare evidence**

The team also quantified male ‘fitness’, which is usually extremely difficult to measure in the wild. Observing males throughout their lifetimes, Deodhar noted how many females each male had access to per day and ‘breeding tenures’, the time for which males occupied territories during the breeding season (the longer this time, the more the access to females). Males that signalled more had longer breeding tenures; thus these signals are relevant biologically because they also affected lifetime reproductive success.

“The biological relevance of this finding is also exciting because it is often difficult to follow individuals across their lifetimes,” says Isvaran. Agamas are well suited to answer this question because they have short lifespans, perform very unusual displays and live in open habitats which makes it easy to study their behaviour, she adds.