Nature's tradeoffs: brawn v. brains, looks v. loyalty

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Biologists assessing the natural world sometimes sometimes sound like hard-nosed executives weighing the costs and benefits of an investment opportunity.

Species, they reason, can't be endowed with every possible trait.

Instead, they get the ones that help them to survive and hand on their genes, even if this comes at a cost.

Two studies published Wednesday by Britain's Royal Society shed light on these intriguing natural tradeoffs.

Examining 647 types of mammals, Theodore Stankowich and Ashly Romero from California State University Long Beach discovered that species boasting impressive protective gear were also not the brightest of beasts.

Pangolins, porcupines and hedgehogs, to name a few, can pretty much go about their business without worrying if they will wind up as some carnivore's midnight snack.

Needle-sharp quills or armour provide excellent protection against predators... except, notably, Homo sapiens.

"The armadillos..., cooked without their cases, taste and look like a duck," Charles Darwin noted in his diary in 1832. "Very good."

But there is an evolutionary price to be paid for all that defensive apparatus.

"Their bearers may accrue extensive production and maintenance costs," Stankowich and Romero write in the journal *Proceedings of the Royal Society B*, sounding rather like industrial analysts.

"Defended species," they concluded bluntly, "become less intelligent."

Other mammals covered by no more than an insulating coat of fur cannot afford to be as carefree as their armoured cousins.

But, despite their vulnerability, these species have an advantage.

They are far better at detecting potential threats and fleeter of fleet of foot in escaping them.

Most critically, they also evolved bigger brains to manage all those tasks, the study found.

Again, that advantage came at a cost: brain power is "extremely energetically expensive," which means the animal has to eat more food, or eat food that is more energy-dense.

The only exceptions to the "either/or" rule, the authors found, were some tree-dwelling animals that had developed both bigger brains and some protective apparatus.

Navigating branches, they hypothesised, would be difficult for the slow-witted.

Mating game

In the other study, Jenelie Dowling of the University of Montana and Michael Webster of Cornell University uncovered a surprising example of how sexual selection—the other engine of evolutionary change—shapes strategies within a single species.

They looked at the Australian red-backed fairy wren, *Malurus melanocephalus* to ornithologists.

These wrens are socially monogamous, which means they hang out in pairs.

But when it comes to sexual behaviour, males have a choice: be loyal or

play the field.

If they couple with as many females as possible, they multiply the chances of progeny—but there's a downside to doing so.

The offspring from a fickle father are more at risk, because they lack a male parent who will defend their territory and protect the mother.

Loyalty, on the other hand, will produce fewer offspring, but the fledglings will have a better chance of survival

The study, published in the Royal Society's *Biology Letters*, used observation and experiments to show how male wrens use their looks to determine this mating strategy.

Males with more colourful plumage—a sign of fitness—are more likely to be nest-hoppers, and therefore sire more offspring but at a higher risk of mortality, they found.

Drabber males, though, are more inclined to stick to a single mate... if they are lucky enough to find one.

More information: The Correlated Evolution of Antipredator Defences and Brain Size in Mammals, *Proceedings of the Royal Society B*, rspb.royalsocietypublishing.or … .1098/rspb.2016.1857

Working with what you've got: unattractive males show greater mate-guarding effort in a duetting songbird, *Biology Letters*, rsbl.royalsocietypublishing.or … .1098/rsbl.2016.0682