

Do native bellbirds have a hidden immunity against exotic predators?

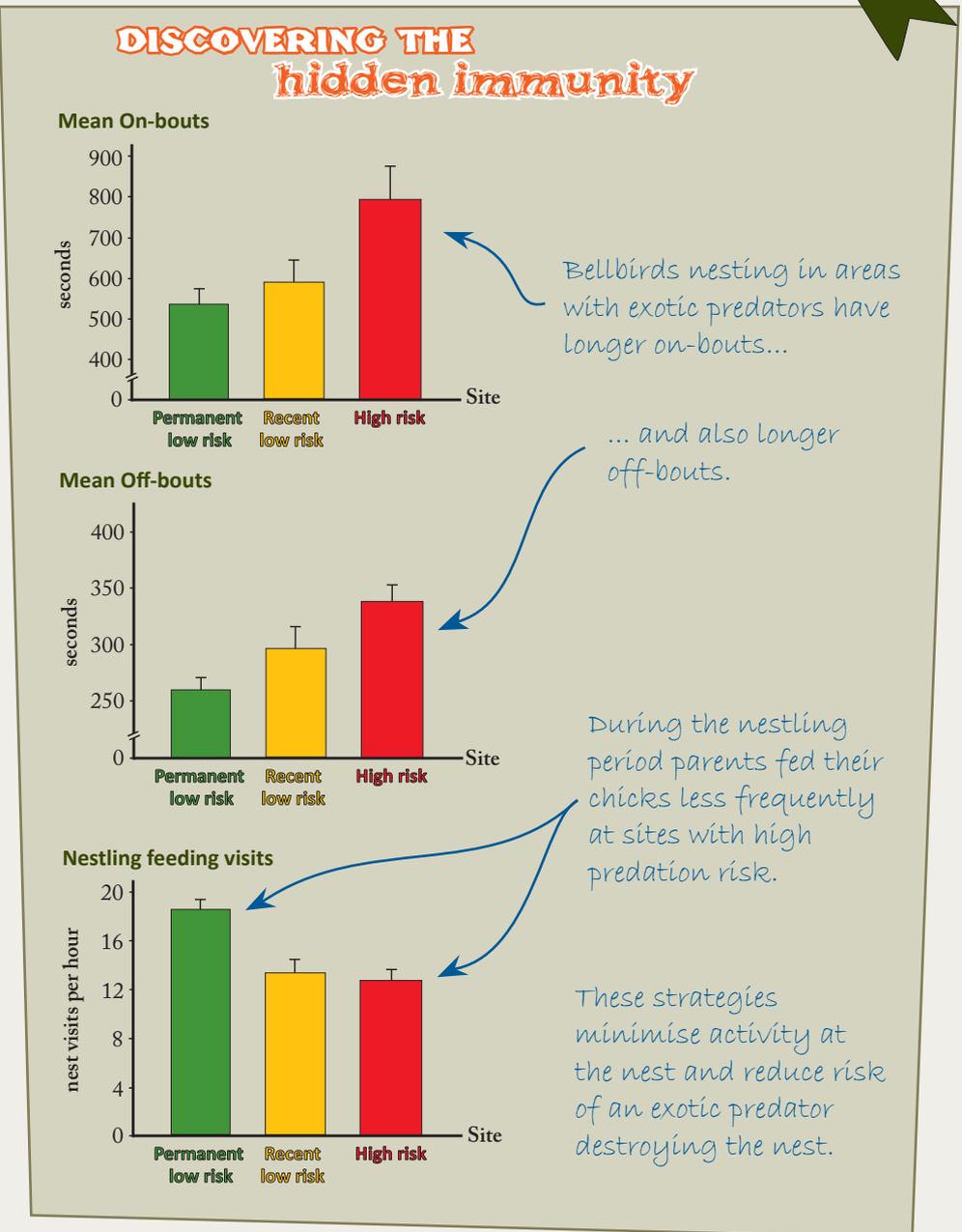


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Have you heard of *Survivor*, the popular reality television game show? In this show, contestants are isolated in the wilderness – most often on a remote tropical island – where they form two tribes that compete in a series of challenges for rewards and immunity from elimination. Ultimately, the goal is to outplay, outwit and outlast the rival tribe.

Just like in *Survivor*, native birds of Aotearoa have been competing against a ‘tribe’ of exotic mammalian predators, such as rats, cats and stoats, over the past 700 years - ever since these predators were introduced to New Zealand by humans. But instead of playing for cash and other prizes, native birds have been fighting for their survival! Since their introduction, exotic predators have caused the extinction of many native birds (e.g. huia, piopio) and continue to threaten the survival of remaining native birds. The impact of exotic predators has been so profound because native birds evolved over millions of years in their absence, and they appear naïve towards exotic predators. What’s worse is that native birds exhibit behaviours and life history traits (e.g. tameness, loss of flight, large size) that make them especially vulnerable to exotic predators, suggesting that they are evolutionarily ‘trapped’. It would appear that the exotic predators are winning this game of *Survivor* in Aotearoa. But if native birds can rapidly adjust their behaviours or evolve in response to exotic predators they might be able to outwit their rival tribe, the exotic predators, instead of being doomed to extinction.

You may wonder how can we possibly uncover the native birds’ secret struggle for survival and find out whether some native birds are able to outwit the exotic predators? A lucky coincidence offers the key to unravel



this mystery: a few islands offshore from New Zealand’s mainland were spared from the invasion by exotic predators. These offshore islands provide a rare glimpse into the past before mammalian predators were introduced to Aotearoa. By comparing birds on these predator-free offshore islands, that have never been exposed to exotic predators (**permanent low risk site**) with birds on New Zealand’s

mainland islands, that have been exposed to exotic predators for the past 700 years (**high risk site**), we can detect whether some native birds have adjusted their behaviours in response to exotic predators. To further examine whether birds assess current predation risk and change their behaviours



accordingly, we also studied birds in a **recent low risk site** on the mainland, where exotic predators have recently been experimentally removed.

Just like in *Survivor*, I used hidden video cameras to secretly film the parental behaviour of bellbirds, a honeyeater native to Aotearoa, at their nests. Videos were scored for number of parental visits to the nest, for how long females incubated their eggs (on-bout) and for how long females foraged away from the nest (off-bout). By comparing parental behaviour of bellbirds among the three sites with varying predation risk, I discovered that bellbirds have a **hidden immunity** and can indeed outwit exotic predators (see figure). This previously naïve bird species has indeed rapidly changed its nesting behaviour in response to exotic predators. For example, bellbirds nesting in areas with exotic predators (**high risk site**) have longer

on-bouts and also longer off-bouts than birds at lower risk sites. This strategy minimises activity at the nest and therefore decreases the risk of an exotic predator locating and eating the eggs. In addition, after the chicks have hatched, bellbird parents fed their chicks less frequently at sites with high predation risk, further reducing the risk of an exotic predator destroying the nest. These changes in bellbirds converge on behaviours seen in other honeyeaters native to Australia, which co-evolved with a variety of predators and developed strategies to avoid predation.

So, what does this all mean? Well, it's not all doom and gloom. As it was revealed during the *Final Tribal Council* bellbirds have a **hidden immunity** against exotic predators. This shows us that bellbirds, and perhaps other native birds in Aotearoa, are not necessarily trapped by their

evolutionary history. In fact, they are able to outwit their enemies, the exotic predators, by changing their nesting behaviours! By carefully taking advantage of the ability of some native birds to respond to exotic predators, we might be able to improve conservation efforts to ensure the long-term survival of threatened native birds.

On the next episode of Survivor Aotearoa:

Are other island birds able to outwit the exotic predators?

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