

'Time-sharing' tropical birds key to evolutionary mystery

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Whereas most birds are sole proprietors of their nests, some tropical species “time share” together – a discovery that helps clear up a 150-year-old evolutionary mystery, says Queen’s University Biology professor Vicki Friesen.

The Queen’s-led international study confirms one of Charles Darwin’s more controversial theories – first put forward in 1859 and since disputed by many experts – that different species can arise, unhindered, in the same place. Others believe that a geographic barrier such as a mountain or a river is required to produce two separate species. Although focused on how species change over time through natural selection, Darwin’s landmark book, *The Origin of Species*, also speculates that it is possible for different species to develop in the same place.

The team’s findings will appear this week in the on-line Early Edition of the international journal, *Proceedings of the National Academies of Science*.

With PhD student Andrea Smith and an international team of researchers, Dr. Friesen studied a small seabird called the band-rumped storm petrel, which nests on desert islands in the tropics and sub-tropics. They observed that one set of petrels will breed in burrows, raise their chicks, and leave for the winter. Then a different set of birds moves in – similar to a vacation “time share” – and repeats the pattern in the very same burrows. When the season changes again, the first set of birds will

return.

“We’re taught today that new species generally emerge as a result of a geographic barrier such as a mountain range or river, creating two separate populations that can’t easily move from one place to the other,” says Dr. Friesen, an expert in evolutionary biology. “While that model fits for many parts of the natural world, it doesn’t explain why some species appear to have evolved separately, within the same location, where there are no geographic barriers to gene flow.”

The evidence for this happening in certain types of plants, insects and fish has led to a number of scientific explanations, such as salmon spawning in the same location at different times of year. Until now, however, there have only been two documented cases that such a pattern might occur in birds, and no clear evidence as to how it happens in any warm-blooded creature.

Using DNA samples retrieved from birds breeding in the Azores, Madeira, Cape Verde and the Galapagos, the researchers determined that petrels breeding in different seasons but from the same burrows did indeed differ genetically. They also learned that the seasonal species had not bred with each other for periods ranging from around 1,000 to 180,000 years, providing a series of “time shots” of divergence, Dr. Friesen explains.

“This is important for us to know, not just as an explanation for how new species can arise, but also because biodiversity is part of a healthy ecosystem and each bird species is part of our natural heritage,” she says, noting that the European Union is now elevating the conservation status of band-rumped storm petrels.

“It’s also exciting to be able to verify Darwin’s original theory!” Dr. Friesen adds.

Source: Queen's University

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