Tropical birds have slow pace of life compared to northern species, study finds

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In the steamy tropics, even the birds find the pace of life a bit more relaxed, research shows. Tropical birds expend less energy at rest than do birds living in more northern climates, according to a study published online this week in the *Proceedings of the National Academy of Sciences*.

"We found that tropical birds have a slow pace of life which is reflected in how much energy they spend to stay alive," said Joseph Williams, co-author of the study and associate professor of evolution, ecology and organismal biology at Ohio State University.

"This is the first time this has been confirmed in birds."

The findings of a slower pace of life in tropical birds correspond to other aspects of the lives of tropical birds, such as their longer life and slower growth.

"Lower energy use fits with the life history of these tropical birds, which is different than those living in temperate climates," said co-author Popko Wiersma, a postdoctoral researcher at Ohio State . Tropical birds live longer, lay fewer eggs and their chicks grow slower than those of temperate birds.

The researchers traveled to Panama where they captured 69 species of tropical birds and measured their basal metabolic rate (BMR) – the minimum amount of energy they expend at rest, solely to maintain their vital bodily functions. This was the largest data set ever collected of

metabolic rates of tropical birds.

They compared these measurements with the BMRs of 59 species of temperate birds.

They found that tropical birds used about 18 percent less energy, as measured by BMR, when compared with temperate birds.

To further test this association, the researchers also compared BMRs in related species pairs. These were birds from the same genus or family, such as flycatchers or swallows, in which one of the pair lived its life in the tropics and one lived in temperate zones.

Even here, the tropical species had BMR scores about 13 percent lower than their relatives from temperate regions.

The researchers also tested neotropical migrants – those birds that live in the tropics much of the year, but migrate north to temperate climates such as the United States and Canada to breed.

Results showed these birds expended more energy than those species that live year-round in the tropics, but still used less energy than birds that were permanent residents in Ohio.

"These birds have a tropical lifestyle, even though they come up north to breed, and that tropical lifestyle is consistent with a reduced metabolic rate," Williams said.

In another experiment, the researchers tested peak metabolic rate (PMR)– how much energy birds expended to keep warm when exposed to cold temperatures. Results showed tropical birds had a PMR that was 34 percent lower than temperate birds. This suggests the physiology of tropical birds is indeed different from that of temperate birds and this

affects their metabolism.

"Tropical birds are unable to create as much heat as temperate species through shivering. Their bodies are not built for that," Wiersma said.

To measure BMR and PMR, the researchers used a standard test in which they placed the birds in airtight steel containers with airflow in and out carefully controlled and monitored. The birds were allowed to get accustomed to the container, and then the researchers measured their oxygen consumption, which leads to the BMR and PMR values. (PMR is measured at very cold temperatures, while BMR is natural temperatures.)

Scientists have believed that tropical birds may have a slower pace of life because it fits with the rest of their life history, Williams said. Tropical birds, compared to those from temperate regions, tend to live longer, and produce fewer offspring which develop slowly and mature relatively late in life.

Among other species, this slower pace of life is associated with lower energy expenditures, but there has not been conclusive evidence of this in birds.

The next step in their research, Williams said, is to learn how and why tropical birds expend less energy.

Source: Ohio State University