ARNAU SOLER

ice AND memory

Peregrine Falcon migration

Avian migration is one of the marvels of the animal kingdom. Over the past few decades, much has been learnt about why birds migrate, where they go, how they navigate and how some can fly as far as 11 000 kilometres non-stop. But many aspects of the evolution of migration remain mysterious, including how migration routes are formed. A new study of Peregrine Falcons, published in the journal *Nature*, has yielded novel and important insights into how migratory routes develop and persist across generations.

The multinational team of researchers behind the paper used satellite transmitters to track 56 Peregrines. The falcons belong to six populations that breed in Russia's vast northern tundra, in distinct breeding areas ranging from the Kola Peninsula in the far west all the way to the eastern Kolyma region within 1000 kilometres of Alaska. The birds use five distinct migration routes: individuals from the two westernmost breeding populations winter in western Europe, those from the central breeding areas migrate to the Middle East and the Indian subcontinent respectively and eastern birds winter in South-East Asia. The peregrines depart from their breeding areas in September and migrate solitarily along routes whose distances range from 2300 to 11 000 kilometres.

The team then examined the falcons' population genetics to reconstruct the birds' recent evolutionary history. The inferred population size began increasing 100 000 years before present and peaked some 20 000 to 30 000 years ago in the depths of the last Ice Age, or Last Glacial Maximum (LGM). By modelling paleoclimate and changes in the distribution of Eurasian tundra when the vast ice sheets of the LGM melted and earth entered a warmer interglacial period, the authors were able to surmise that the five major migratory routes followed by Peregrines today developed as the ice receded and the distribution of tundra shifted northwards, contracting as it went. The species' population peak during the LGM is thought to reflect the far greater expanses of tundra then present in Siberia, compared to during warmer interglacial conditions.

But it was a deeper look into the falcons' DNA that revealed the study's most impactful finding: evidence for a 'migration gene'. The researchers found that one particular gene, known as ADCY8, differed in a consistent way between Peregrine populations that followed longer migration routes and those whose migration routes are shorter. Intriguingly, the ADCY8 gene also plays a pivotal role in long-term memory in many animals, including humans. The authors argue convincingly that differences in ADCY8 are responsible for population-level differences in migration distance. In essence, some Peregrines have evolved better long-term memory, which facilitates longer migrations.

In addition to reconstructing the influence of past climates on the development of the Peregrines' migration routes, the authors modelled how climate change will affect future migration. Warming will cause the tundra to shrink and contract northwards and the eastern Peregrine populations will face longer migration distances with increased mortality risk along the extended routes. Western Peregrines, however, will lose nearly all of their current breeding areas and may well stop migrating altogether.

ANDREW McKECHNIE

Reference

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birds to watch

American Cliff Swallow

With the increase in the number of birders, new species have been added to the southern African bird list with surprising regularity over the past few years. A popular pastime among twitchers – often indulged in on long road trips to chase yet another vagrant – is to speculate what the next 'mega' to reach our shores will be. Another species to add to that list is the American Cliff Swallow *Petrochelidon pyrrhonota*.

The 11 species of *Petrochelidon* swallows occur across the world, with five species in Africa, one in southern Asia, two in Australasia and three in the New World. In southern Africa we are familiar with the South African Cliff Swallow *P. spilodera*, which breeds in colonies, mainly under bridges, in summer and migrates north to winter in central Africa.

The Red-throated Cliff Swallow *P. rufigula*, which occurs from Gabon to Angola and northern Zambia, has sometimes been flagged as a possible vagrant to southern Africa. It is slightly smaller and more slender than its southern cousin, with white tail spots and a plain breast, lacking the dark breast mottling characteristic of the South African Cliff Swallow. The movements of the Red-throated Cliff Swallow are not well known, but it appears to be at most a partial migrant, so the chances of one reaching southern Africa may not be very high.

Perhaps a more plausible vagrant is the American Cliff Swallow, which breeds across much of North America, from northern Alaska to southern Mexico, and winters south to Argentina and Uruguay. Since the 1980s, some American Cliff Swallows have taken to staying over in Argentina, building nests but are apparently not yet confirmed to lay eggs (unlike the Barn Swallow, which has established a thriving breeding population centred on Buenos Aires). Flocks occasionally wander as far south as Tierra del Fuego and the species has been recorded from the Falkland Islands. Transatlantic vagrants have reached Western Europe.

DON DEBOLD/CREATIVE COMMONS

PETER RYAN

American Cliff Swallows are common migrants to southern South America, and recent sightings from Tristan da Cunha and Gough Island (lower image) indicate the potential for them to reach southern Africa.

I hadn't considered it as a candidate to reach southern Africa until April 2021, when I saw two on Gough Island, more than halfway from South America to southern Africa. A Barn Swallow was seen feeding over the island on 15 April, but on 20 April four swallows were seen in front of the base – two Barn Swallows and two cliff swallows. Viewing conditions were challenging; the birds were mainly backlit against a grey, rainy sky, but photographs confirmed that they were American Cliff Swallows. A third Barn Swallow arrived on 21 April, but by 26 April only one Barn Swallow and one American Cliff Swallow remained and none was seen after that. It appears that this is not the first time American Cliff Swallows have reached the Tristan archipelago; the RSPB's Andy Schofield reports seeing several at Tristan and Nightingale Island in the past few years.

The American Cliff Swallow is distinctly smaller than its South African counterpart and has a pale golden frons that contrasts with the dark red face and throat, a dark blue crown and a pale buff nuchal collar. The sides of the buffy-orange rump are scaly and the vent is paler than in the South African Cliff Swallow. It typically has one or more narrow white streaks running down the centre of the back, like the Red-throated Cliff Swallow, but lacks that species' white tail spots.

Like many other cliff swallows, the American Cliff Swallow has benefited from breeding on man-made structures and its range and population have increased greatly, particularly in the south-eastern USA. More swallows mean more chances for vagrants to get blown off course on their migrations and potentially reach southern Africa. Perhaps the first American passerine to be recorded from southern Africa will be a swallow.

PETER RYAN