On a wild goose chase after the world's highest migrant

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(PhysOrg.com) -- The remarkable achievements of the world's highest flying geese have been revealed by researchers from Bangor University and are reported in the prestigious American scientific journal: *Proceedings of the National Academy of Sciences* (*PNAS*).

Drs. Charles Bishop and Lucy Hawkes, from Bangor University, and a large international team of researchers, report that bar-headed geese (Anser indicus) can fly up to 6,000m in only 8 hours while passing over the Himalayan mountain range – a similar intense climb could kill a human without lengthy acclimatisation. The geese make the journey on their annual spring migration from India to Central Asia. The team followed the migrations of these geese every hour using GPS satellite tags, following capture of the birds in India and Mongolia, where they winter and breed, respectively. In the study published today, they show that the geese can make the long climb in a single flight and that, surprisingly, rather than waiting for potentially favourable and predictable wind conditions to help carry them up and over the Himalaya (as had been thought previously), they wait for the winds to die down, and then make the climb over the mountains in the relative calm and peace of the night and early morning.

"We think the geese may be essentially risk averse", said Dr Charles Bishop (Principal Investigator of the project), "with the calmer winds at night offering an extra degree of safety and helping to avoid storms. The birds may also find it easier to keep together and to fly in formation".

The earlier flight times in the cooler, denser, morning air could help the geese to avoid the heat load of flying during the hottest time of the day in India whilst performing their intense workout.

“We were amazed to see that the geese were maintaining these climbs for hours on end” said Dr Lucy Hawkes. “It seemed quite enough that they could cope with such intense exercise at altitude, let alone that they didn’t stop to take regular breaks during the climbs, which last for at least seven hours over the Himalaya”.

Denser air will also improve the lift generated by the wings and reduce the overall cost of flying, while improving the amount of oxygen available to the birds. Studies of a similar bird, the Brent goose (Branta bernicla), while migrating between Ireland and Canada, have suggested that their ability to climb while flying is so poor that they may land and walk across the imposing Greenland ice cap rather than maintaining flight! This makes the migration of the bar-headed goose seem even more remarkable and these true athletes retain the title of the world’s highest migrant.

“It remains a fascinating question as to just how much higher these geese might be able to fly”, said Professor Pat Butler (Co-investigator on the project from the University of Birmingham), “as, rather sensibly, the birds kept relatively low to the ground and did not seem to fly higher than necessary”.

At 5,500 m atmospheric pressure and, therefore, oxygen density and availability, is only half of that at sea level. Near the top of Mount Everest, conditions can be even more inhospitable, with temperatures well below zero and the partial pressure of oxygen reduced to only a third of that at sea level. Humans struggle even to walk above 7000 m, so it seems incredible that these large geese may be able to sustain flapping flight at heights were even helicopters cannot fly due to the thin air.

However, what we do know is that the bar-headed goose makes an annual migration, climbing from sea level and over the Himalayan mountain chain in less than a day, and that they do so without any training or acclimatisation for the flight.

Provided by Bangor University