Colugos glide to save time, not energy

July 28 2011

Gripping tightly to a tree trunk, at first sight a colugo might be mistaken for a lemur. However, when this animal leaps it launches into a graceful glide, spreading wide the enormous membrane that spans its legs and tail to cover distances of up to 150m. So, when Greg Byrnes and his colleague Andrew Spence from the University of California, Berkeley, USA, were looking around for a mammal to carry the accelerometer/radio transmitter backpacks that the duo designed to track animals in the field, the colugo was an obvious choice.

'They are a large glider and it was an opportunity to learn about an animal that we didn't know much about,' says Byrnes. Admitting that they were initially interested in the natural history of these charismatic creatures, Byrnes realised that they could use the information gathered to find out about the cost of the colugo's gliding lifestyle. Flying to Singapore, Byrnes teamed up with Norman Lim to track the gliding mammals and the team discovered that instead of saving energy, colugos glide to save time. They publish this discovery in The Journal of Experimental Biology .

Describing how some of the nocturnal colugos roost low in the forest, Byrnes was able to capture six of the mammals and glue the accelerometer packs to their backs before allowing them to scurry back up their trees for their first glide of the night. Explaining that the data loggers were able to collect data for 3□□ days, Byrnes and Lim tracked the animals until the data loggers eventually fell off and they were able to retrieve them several weeks later.

Back in Berkeley, Byrnes, Spence and Thomas Libby had the unenviable task of managing the colossal amount of data collected: 'We were sampling at 100Hz for days,' explains Byrnes. According to Byrnes, there is a distinctive acceleration profile when they glide. 'What you see is the leap and the landing when there is this sweeping acceleration, so it's easy to pick out their glides,' he says. Eventually, the trio converted each animal's acceleration traces into velocities – as they scaled trees and glided – and then they calculated the distances that the animals covered.

Analysing the glide trajectories, the team realised that the colugos only climb a relatively small height to achieve their lengthy shallow glides. 'The average was 8 m for an animal that is gliding 30□□m,' says Byrnes. But how much energy were they using to cover that distance?

Basing their calculations on the amount of energy used by small climbing primates – close relatives of the colugo – the trio calculated the energy used by a colugo ascending a tree to initiate a glide. Then they calculated the amount of energy that the animals would use if they had clambered through the canopy to cover the glide distance and were amazed to see that instead of saving energy, the colugos were using 1.5 times more energy. 'This was a surprise, as the dogma has always been that gliding is cheaper,' says Byrnes.

However, one thing was clear: gliding was faster. 'If you watch the animals move through the trees they move pretty slowly,' says Byrnes, 'But they can go 10 times as fast and cover long distances gliding so they can spend more time foraging,' he explains. Gliding could also protect colugos from dangerous predators and reduce the risks of climbing on spindly branches, so it could be more of a long-term benefit than simply saving energy

More information: Byrnes, G., Libby, T., Lim, N. T.-L. and Spence, A. J. (2011). Gliding saves time but not energy in Malayan colugos. J.

Exp. Biol. 214, 2690-2696. doi: 10.1242/jeb.052993