INSIDE JEB

Migratory Okavango zebra navigate to water holes

A zebra in the Okavango Delta wearing a GPS collar.
Photo credit: Tatjana Hubel.

When the north Nxai Pan fence, which had divided the Okavango Delta from the lush grasslands of the Makgadikgadi saltpans in Botswana for almost 40 years, was removed in 2004, no one knew whether the zebra (*Equus quagga*) that had migrated between the two locations could resume their annual journey. 'The fence was a veterinary cordon that was put up by the government to try to separate wildlife and cattle to prevent the spread of disease', says Hattie Bartlam-Brooks from the Royal Veterinary College (RVC), UK. Yet, when Bartlam-Brooks, Casper Bonyonogo (University of Botswana) and Stephen Harris (University of Bristol) fitted GPS collars to 21 zebra in 2006, they were amazed to discover that six left their Okavango home, resuming the 600 km round journey that their ancestors had undertaken four generations earlier. 'These migratory zebra seem to be exceptionally skilled at moving through their environment,' says Bartlam-Brooks. In addition, the Okavango zebra routinely journey from their grazing areas to water holes up to 20 km away during the dry season. Intrigued by the zebra's uncanny sense of direction, Bartlam-Brooks, Emily Bennitt (University of Botswana) and Alan Wilson (RVC) wondered whether the determined creatures depend on a few well-trodden routes to reach their water holes or were capable of navigating a range of different paths to get a drink.

'The hardest aspect of the study was finding zebra from the specific migratory population… it was a long process identifying which areas they used and which animals were suitable for darting', says Bartlam-Brooks, adding that many Okavango zebra do not migrate to pastures new. 'We did a lot of driving around', she chuckles. After tranquilising each animal with a dart, Wilson checked the unconscious animal's condition while Bartlam-Brooks and Bennitt fitted a GPS collar. 'The collars were fitted with solar panels that recharged the collar's batteries, allowing more GPS fixes to be recorded for a longer period', says Bartlam-Brooks. Wilson then administered a fast-acting antidote, so that the animals were back on their feet within a minute, before leaving them to roam free. Downloading the animals' meanderings from their collars 3 months later, at the end of the dry season, the team identified 217 journeys to water holes, averaging ∼4 km with the longest over 15 km.

Back in the UK, Bartlam-Brooks, Simon Wilshin, Tatjana Hubel and Stephen Hailes began the Herculean task of unravelling the traces to find out which strategy the zebra use when travelling to and from water holes. Calculating the twistiness of the animals' routes and whether they were following a few well-established ways or navigating via subtly different paths each time, the team was eventually convinced. The zebra were navigating fresh routes each time, albeit toward the same goal. 'We were impressed that zebra rarely needed to use the same routes to navigate successfully, even when previously used tracks were close to where they currently were', says Bartlam-Brooks. And the zebra didn't appear to be led astray by trails that crossed their paths.

Suspecting that this extraordinary population of zebra navigate using local landmarks or the position of the sun, Bartlam-Brooks is keen to test both theories by shifting zebra off track as they journey toward their water holes and observing how they recover from the mishap. 'This type of study will help us to understand how zebra are using physical landmarks and other cues to achieve such impressive navigation skills', she says.

10.1242/jeb.240051

Bartlam-Brooks, H., Wilshin, S., Hubel, T., Hailes, S., Bennitt, E. and Wilson, A. M. (2020). There and back again – a zebra's tale. *J. Exp. Biol.* **223**, jeb232140. doi:10.1242/jeb.232140

Kathryn Knight
kathryn.knight@biolgists.com