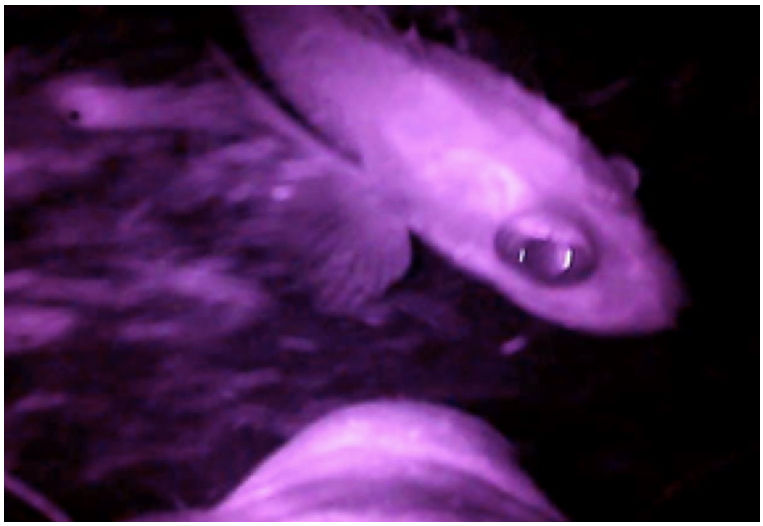
INSIDE JEB

Cameras do not lie: elephant seals prefer fish



An unknown fish captured by a head camera just before consumption. Photo credit: Kaori Yoshino.

Modern teenagers think eking out a few more minutes from their dying mobile phone battery is a chore, but spare a thought for Akinori Takahashi from The Graduate University for Advances Studies and Yasuhiko Naito from the National Institute of Polar Research, both in Japan. Battery life can be a major obstacle for researchers tracking the behaviour of animals migrating through oceans. 'The duration of video recordings is limited to several hours or days', says Takahashi. So, when Naito and Daniel Costa from University of California Santa Cruz, USA, wanted to find out which species elephant seals (*Mirounga angustirostris*) dine upon during their 2.5–7.5 month foraging odysseys, by attaching a video camera to the mammals' heads, they knew they would have to crack the battery problem.

Even though the solution seems straightforward – only switch on the camera and infrared lights when needed – Naito had to figure out a three-stage trigger that recognised when a seal was on the verge of catching a snack. Knowing that it takes the voyagers several weeks to reach their feeding grounds, the team first fitted a timer that only activated the system once the seals were out at sea. Then they added a depth meter, so that the equipment was primed once seals had reached the depths at which they forage (400–800 m). Finally, the researchers included an accelerometer to activate the camera and infrared flash as the seals surged forward, ready for the kill.

Having assembled the camera tag, the team headed to Año Nuevo State Park on the Northern California coast, USA, to attach the camera and sensors to the head or jaws of female elephant seals before they embarked on their epic odyssey. 'We always needed to be careful of big male seals around us, to avoid them smashing our gear', says Takahashi, adding 'We needed to anaesthetize the females because they are large and we needed them to stay still while we carefully adjusted the angle of the cameras on their heads… to take good footage of prey capture'.

Releasing the first seals on their annual voyage in 2013, Takahashi admits that he was anxious as he waited for them to return 3 months later. And when the team eventually downloaded the first submerged video clips, they were excited to see fish and squid loom into view before vanishing into the hungry seals' jaws.

Eventually, after deploying 15 cameras over 5 years, the team retrieved almost 50 h of footage, capturing almost 1500 dives across the eastern North Pacific as the elephant seal females feasted on almost 700 animals, including lantern fish and squid, over depths ranging from 239 to 1167 m in chilly 3.2–7.4°C waters. And while some of the intercepted animals seemed to be caught unawares by the impending attack, others made a valiant dash for safety; some squid even produced defiant bioluminescent flashes, which appeared to captivate the seals.

However, when the team analysed which species the seals preferred to dine upon, they were surprised that fish accounted for at least 78% of the diet, with squid only contributing up to 10%. 'Our data offer a contrasting view to previous studies based on stomach contents', says Takahashi, which had suggested that the seals dine predominantly on squid. However, the team attributes the discrepancy to the squids' tough beaks. They probably remain longer in the seals' stomachs than other more easily digested morsels, giving the impression that elephant seals prefer squid, when, in reality, fish is far higher up the menu.

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