



PETER RYAN

# check your mate

**K**ing Penguins breed en masse at sub-Antarctic islands, with most pairs occurring in vast, sprawling colonies. How seabirds find – and keep – their mates in these teeming crowds that sometimes number tens of thousands of birds has long fascinated biologists. King Penguins face an additional problem compared to most seabirds because they lack a fixed nest site. Adults incubate on their feet and so a partner could shuffle some distance from where it was entrusted with the precious egg at the end of the previous incubation shift.

Before a King Penguin can attempt to breed, it obviously needs to find a mate. A recent paper by a group of French researchers (Kriesell et al. 2018; *Ibis*, doi: 10.1111/ibi.12577) explored how King Penguins tell potential mates from rivals.

*above Sight doesn't help King Penguins to find mates in the crowd, but odours may do.*

In this species, size differences are at best subtle and, like most seabirds, it lacks obvious plumage differences between the sexes. Some studies have claimed to detect sex-specific differences in the penguins' striking orange head patterns, but Kriesell and colleagues found no such variances. The females are on average slightly smaller than the males, with bill length providing the best clue to sex, correctly identifying almost 80 per cent of individuals.

Vocal cues are probably more useful to the penguins. Playback trials using modified adult calls have shown that mates can identify their partners by subtle differences in the rate of frequency modulation in their call notes. Kriesell and colleagues found consistent sex-linked differences in call structure at colonies in the Crozet and Kerguelen archipelagos. Males' calls contain more, shorter notes than females' and the two sexes' calls have distinct note sequences.

Previous studies have also shown that King Penguin chicks identify their parents by unique characteristics in their calls. Once the chicks are able to maintain their body temperature, they crèche with other chicks, enabling both parents to go to sea. Adults returning from foraging call when they reach the crèche. The chicks are able to pick out their parent's call in the hubbub of the colony using similar frequency-modulation signals – an example of the 'cocktail-party' effect, whereby you can pick out relevant signals (like someone mentioning your name) from a noisy background.

It is less clear how adults decide which chick is theirs, as returning adults are often mobbed by several chicks. Vocal cues may again be important, although this has not been tested. Are there any other cues that might help the penguins identify their kin?

We've known for some time that penguin species share a discerning nose, as do their close relatives, the petrels. In addition to finding prey at sea, petrels use their sense of smell to locate their burrows – an important skill given that many species only return to their colonies at night. Some penguins use scent cues to locate prey, but can they also use smell to identify their mates? Several recent behavioural studies suggest that King Penguin adults and chicks respond to odours in a social context (*J. Exp. Biol.*, 212: 210–216 and 218: 3374–3376).

Marianne Gabriot and colleagues (2018; *Ibis*, 160: 379–389) investigated whether King Penguins have distinctive odours that might be used for identification. They found 26 volatile organic compounds on the penguins' feathers, with differences among individuals but not between sexes. The compounds were similar to those already shown to be used by prions and Blue Petrels to recognise partners. The authors note that further tests are needed to confirm that the penguins actually use these cues, but the raw materials are there. At least superficially, it would appear that the penguins face greater challenges than petrels do, given the need to compete with the more than pungent guano smell that characterises King Penguin colonies!

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