ECOLOGY

Iceberg unveils secret ecosystem

Biologists rush to study life exposed under Antarctica's Larsen C ice shelf before it changes.

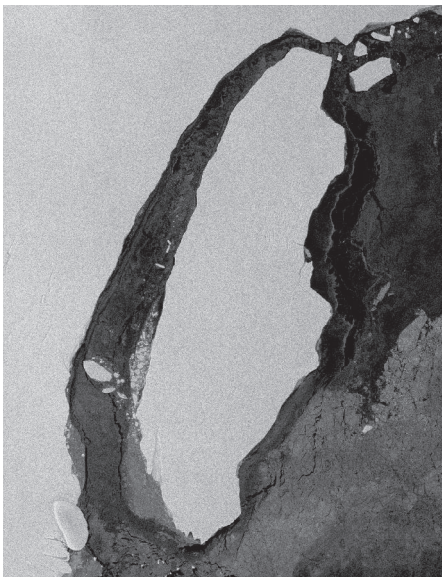
BY JO MARCHANT

Biologists are racing to secure a visit to a newly revealed region of the Southern Ocean as soon as it is safe to sail there. One of the largest icebergs ever recorded broke free from the Larsen C ice shelf on the Antarctic Peninsula in July. As it moves away into the Weddell Sea, it will expose 5,800 square kilometres of sea floor that have been shielded by ice for up to 120,000 years. If researchers can get to the area quickly enough, they'll have the chance to study the ecosystem beneath before the loss of the ice causes it to change.

"I cannot imagine a more dramatic shift in environmental conditions in any ecosystem on Earth," says Julian Gutt, a marine ecologist at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany.

It is difficult for Antarctic scientists to respond quickly to sudden events, because polar-research vessels are usually booked months, if not years, in advance. A German research mission led by Boris Dorschel, head of bathymetry at the Alfred Wegener Institute, was already scheduled to visit the Larsen area and will now include a biodiversity survey of the exposed region in March 2019.

Hopes for reaching the region this Antarctic summer lie with the British Antarctic Survey (BAS) in Cambridge. The agency has a fast-track proposal sparked by the calving event, led by BAS senior biodiversity scientist Katrin Linse, to send a research vessel in early 2018. The proposal is now being considered by a British funding council. South Korean researchers are also considering whether to divert a mission currently planned for the South Shetland Islands, says Hyoung Chul Shin, a biological oceanographer at the Korea Polar Research Institute in Incheon.



The calved iceberg is about the size of Delaware.

COPERNICUS SENTINEL-1 VIA BAS

If the BAS proposal is successful, it will be the first time marine biologists have been able to explore such an ecosystem so soon after the break-up of the ice. Nearby sections of ice shelf, at Larsen A and Larsen B, broke away in 1995 and 2002, respectively. But it was several years before the ocean cleared of sea ice and biologists could safely visit the area. Gutt was first in with a detailed survey, leading a team of about 50 scientists on the German research vessel *Polarstern* in 2007. The group sampled hundreds of species in areas exposed by the break-ups at Larsen A and B, and saw signs of a unique ecosystem with more deep-sea species than elsewhere on the Antarctic continental shelf (J. Gutt *et al. Deep-Sea Res. II* **58,** 74–83; 2011). But other species were already moving in, including fast-growing sea squirts, krill and minke whales. "By then, a lot had happened," says Linse.

Video footage taken by geophysicists on a US Antarctic Program cruise at the Larsen B site in March 2005 had unexpectedly showed most of the sea floor covered with a white mat, which the team interpreted as a layer of sulfur-eating microbes, as well as large clams, which were also chemotrophic — that is, living on energy sources other than the Sun. It was the first report of a chemotrophic ecosystem in the Antarctic. But when the *Polarstern* arrived two years later, Gutt's team saw only dead clamshells and a layer of decaying plant matter and sediment.

Biologists will discuss research priorities for Larsen C and future exposed regions at a meeting at Florida State University's Coastal and Marine Laboratory in St Teresa on 18–19 November. Meanwhile, Linse's team is waiting to learn whether the BAS mission proposal will be approved, and monitoring the iceberg in satellite images. "We need the wind to blow the iceberg out a bit more and to blow the sea ice out of there," says BAS spokeperson Athena Dinar. ■

BIOLOGY

Competition shapes ducks' penis size

When forced to vie for mates, some birds develop longer penises and others only nubs.

BY AMY MAXMEN

Some male ducks respond to sexual competition by growing an extra-long penis, whereas others develop a nub of flesh, a study finds. The unusual phenomena occurred in two species studied: the lesser scaup (*Aythya affinis*) and the ruddy duck (*Oxyura jamaicensis*). They suggest that penis size — in line with many traits and behaviours meant to impress or allow impregnation of the opposite sex — involves a trade-off between the potential to reproduce and to survive.

Patricia Brennan, an evolutionary biologist at Mount Holyoke College in South Hadley, Massachusetts, compared the penises of ducks kept in male–female pairs to those housed with multiple males per female (P. L. R. Brennan *et al. Auk Ornithol. Adv.* **134**, 882–893; 2017).

"If they were alone with a female, the males just grew a normal-sized penis, but if there were other males around, they had the ability to change dramatically," Brennan says. "So evolution must be acting on the ability to be plastic — the ability to invest only in what is needed in your current circumstance."

Because evolutionary success relies on reproduction, genitals are adapted to meet the varied circumstances that every animal faces. Some male ducks, for example, have penises in the shape of corkscrews to navigate the labyrinth-like vaginas of their female counterparts. An earlier study by Brennan found that females' anatomy evolved to prevent access to undesirable males who try to force copulation (P. L. R. Brennan *et al. Proc. R. Soc. B* **277,** ▶