WILDLIFE

The seventh sense: electroreception

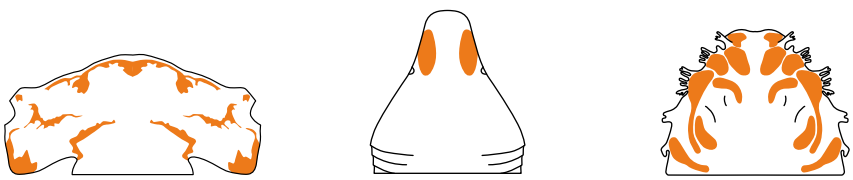
FOR ALMOST 500 million years, sharks have evolved an arsenal of adaptations to help them locate and capture their prey. Like all fish, sharks have a sixth sense: a lateral-line system that detects vibrations made by passing fish. What sets sharks apart, however, is their acute seventh sense. Known as electroreception, it allows them to 'see' the electric fields emitted by all forms of life.

"They do it by using tiny pores all over the surface of their heads," says Ryan Kempster, a PhD student at the University of Western Australia. "They can detect incredibly weak electric fields, down to about one-billionth of a volt. That's the sort of current you'd get if you connected a battery from your TV remote in a circuit right across the Atlantic Ocean."

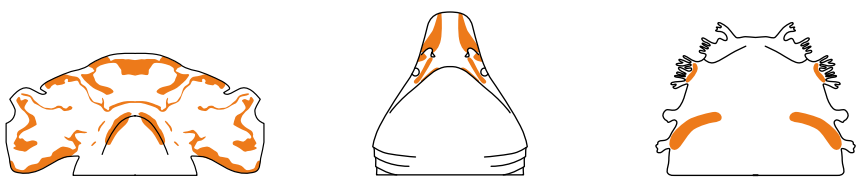
Ryan is mapping the pattern of these electroreceptive pores on more than 120 species of shark. Different species have evolved particular pore patterns to suit different feeding styles, he says, and three of the most extreme examples are shown below.

BEAU GAMBLE

DORSAL (UPPER SURFACE OF HEAD)



VENTRAL (LOWER SURFACE OF HEAD)



PREDATOR

Hammerhead shark
Sphyrna lewini

As an open-water predator, the hammerhead needs to locate prey from all directions. "It'll be chasing fast-moving fish, and those fish can be gone in a flash," Ryan says. "It needs to be able to follow them." To do this, the hammerhead has developed electroreceptive pores over its head – roughly an equal number on its dorsal and ventral surfaces. And with more known pores than any other shark – about 3000 – it uses electric fields to create crystal-clear images of its surroundings.

FILTER FEEDER

Basking shark
Cetorhinus maximus

Rather than chasing fish, hulking filter feeders such as the basking shark consume clouds of tiny zooplankton that drift with ocean currents. With little need for a high-precision sensory system, this shark has evolved only about one-tenth the number of pores as hammerheads. Electroreception still plays an important role by letting the basking shark know when it's surrounded by zooplankton, and should start to filter feed. "It makes feeding a lot more efficient," Ryan says.

BOTTOM FEEDER

Wobbegong shark
Orectolobus maculatus

Most bottom feeders have a high concentration of pores on the underside of their heads to detect animals like mussels and crabs hiding beneath the sand. But the wobbegong shark, instead of feeding on prey below, lies camouflaged and still on the seabed, and lunges up at small fish. More than 90 per cent of its electroreceptive pores are located on the dorsal surface of its head. "It makes perfect sense – they like to ambush their prey as it swims past," Ryan says.

BOOKS

A Flutter of Butterflies

MICHAEL BRABY, NATIONAL LIBRARY OF AUSTRALIA, $34.95

The National Library of Australia's collection of detailed and stunning butterfly and moth illustrations is showcased in this book. The work by renowned Australian artists – including Charles McCubbin and sisters Harriet and Helena Scott – is beautifully displayed, with work spanning from the 1770s through to the turn of this century. Gorgeous colour images are complemented by an essay on the history of collecting, identifying and recording Australian butterflies and moths.

Pedder Dreaming

NATASHA CICA, UQP, $59.95

Olegas Truchanas' tireless work as a photographer determined to protect Tasmania's wilderness is recognised in this beautiful book by Natasha Cica. Olegas, a Lithuanian émigré, devoted years to campaigning to save Lake Pedder from its eventual flooding in 1972, along with a group of Tasmanian landscape artists known as the Sunday Group. *Pedder Dreaming: Olegas Truchanas and a lost Tasmanian wilderness* tells their stories, and displays stunning photos by Olegas from the 1950s onwards and art by the Sunday Group.

SHARK ILLUSTRATIONS: ROGER SWAINSTON / ANIMA; SOURCES: STEPHEN KAJIURA; RYAN KEMPSTER; SUSAN THEISS.